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ACQUISITION CORPS

MEDICAL RESEARCH & MATERIEL ACQUISITION

FROM THE ARMY ACQUISITION EXECUTIVE

Reaping The Benefits Of Army Medical Research

The year is 1775. General George Washington orders the immunization of the Continental Army against smallpox. The wrath of this contagious disease is taking its toll on his troops. It must be stopped. Reluctantly, the soldiers line up for a primitive vaccine. They don't know it, but they are the fortunate ones. They remain fit to fight and go on to win the American Revolution. Never before had mass vaccinations been used to prevent and control an epidemic. This was a defining moment for the role that medical research would play in our National defense.

When one thinks of the U.S. Army, one thinks of fighting and winning wars on land, not wars against bacteria, parasites, and other micro-organisms. It is remarkable to learn about the many contributions that the Army medical research community has made in preventing and treating diseases that wage war against the Army and plague mankind. At the turn of the 20th century, MAJ Walter Reed proved that mosquitoes transmit yellow fever. His findings led to an emphasis on controlling these insects. This was the start of the Army's study of the mosquito and its link to dread disease. During World War II, the Army established a continuing medical research program for the development of new drugs to control malaria. This mosquito-borne parasite is cunning and inventive and quickly develops resistance to each new method of attack. Army researchers are always on guard.

The Army has developed many lifesaving vaccines. In the early 1900s, an Army physician developed a vaccine for typhoid fever that was administered to all soldiers and sailors by 1911. In the 1960s, Army researchers developed a vaccine for Venezuelan equine encephalitis. During that same period, they also isolated the rubella virus, enabling later development of a vaccine for German measles by the National Institutes of Health (NIH). Army researchers developed a vaccine for adenovirus. Severe upper respiratory infections caused by this virus were a leading cause of hospitalization and a major reason why recruits dropped out of basic training and repeated it when they got well. In the 1980s, the Army fielded drugs for the treatment of nerve agent injury and developed vaccines for hepatitis A and Japanese B encephalitis.

Army researchers have made other significant contributions to mankind. The Army is a world leader in the field of blood research. Because of Army contributions to modern preservation and transfusion technology, people of all ages and walks of life now survive injuries involving massive blood loss. While researchers discovered the secret of how to preserve blood during World War I, it was in World War II that the Army made great progress. Researchers developed kits for sterile collection and typing of blood from donors; a system for mass collection and shipment of liquid and dried plasma; the first blood bank; and contributed to a system of whole blood storage, refrigeration, and shipment. In Korea and Vietnam, progress continued as the Army initiated rapid evacuation of casualties by helicopter. This led to development of trauma centers and trauma medicine as a specialty. In the 1970s, the Army developed a blood preservative to extend the shelf life of stored whole blood. In the 1980s, a post-thaw preservative for frozen blood was developed.

In another significant health care area, Army physicians quickly recognized that burn victims need specialized care immediately after injury. The Army established the Nation's first burn center in 1949. Researchers learned that after an extensive burn, the body's natural defense, the skin, is destroyed. Burn patients can lose enough body fluid in the first day following injury to shut down their kidneys and die from shock. In the past, if burn victims did not succumb to shock from fluid loss in the first day, they usually died of infection during the first week. Army researchers knew that until the burn heals, the body needed extra protection, and they developed a thick, white cream known as Sulfamylon. When applied frequently to the burn wound, the cream kills bacteria before it can cause serious infection. There are also related injuries that complicate burn victims' chances of survival. Inhaling smoke or other chemical fumes can damage lungs. Using the latest technology, Army scientists have developed machines to help injured patients get needed oxygen. Another life-threatening complication in burn victims is a bleeding ulcer. Before Army researchers found the solution, no one knew why this happened. Researchers showed that neutralizing the excess acid poured out by the stomach lining soon after injury could prevent the lethal ulcers. Using a combination of antacids and the drug Cimetidine means that burn patients no longer die of bleeding ulcers.

With all the breakthroughs and successes in Army medical research, it will be exciting to see what the future holds. Army researchers work to fulfill the dream of man-made blood to eliminate the medical and logistical concerns associated with the use of natural blood. They have a leading role in HIV and AIDS research. They are pioneers in the field of biological and chemical defense. There is also the great promise of teaming. One of the foremost innovations of 1998 was the fibrin sealant bandage developed by the American Red Cross in collaboration with the Army. This revolutionary dressing permits rapid control of blood loss in treating traumatic injuries. Experts estimate that if the fibrin bandage had existed during the Vietnam War, 6,000 fewer names would be on "The Wall." Hemorrhaging accounts for a large number of deaths on the battlefield.

So what does the future hold? In the field of medical research, many agree that biotechnology is our path to the future. The Army Research Office sponsors the National Biotechnology Information Facility to encourage information sharing among researchers in academia, industry, and government. The most recognized study in this area is the Human Genome Project. Coordinated by the Department of Energy and NIH, the project is designed to identify all of the approximately 100,000 genes in human DNA; determine the sequences of the three billion chemical bases that make up human DNA; store this information in databases; develop tools for data analysis; and address the ethical, legal, and social issues that may arise from the project. Knowledge about the effects of DNA variations among individuals can lead to revolutionary new ways to diagnose, treat, and someday prevent the thousands of disorders that affect us.

Knowledge about the DNA composition of human parasites, viruses, and bacteria will enable the design of new or improved vaccines and new drugs to prevent and treat infectious diseases. The Army currently provides major funding to a group of U.S. Navy scientists who collaborate with NIH and university scientists from around the world to unlock the secrets of malaria DNA. Vaccines for malaria, common diarrheal illnesses, and dengue ("break-bone fever") are all in advanced stages of development by teams of Army and Navy scientists. Army medical research, like the Army itself, is constantly evolving to prepare for and meet the demands of today and the challenges of tomorrow.

Paul J. Hoeper

PAUL J. HOEPER
*Assistant Secretary of the Army
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and Technology)*

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*Commanding General
U.S. Army Materiel Command*

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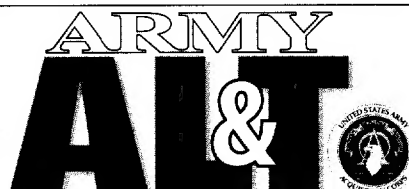
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FEATURES

COVER

Effective management of the medical materiel acquisition process is
extremely important in maintaining, sustaining, and protecting the soldier.

AQM00-09-2839

Inventing The Future, Sustaining Our Soldiers Today . . .

THE U.S. ARMY MEDICAL RESEARCH AND MATERIEL COMMAND

MG John S. Parker
Commanding General, U.S. Army Medical Research and Materiel Command

As a result of a structural overhaul directed by the Army Surgeon General to revitalize the Army's Medical Department, the U.S. Army Medical Research and Materiel Command (MRMC) was officially established in 1994. This reorganization, which has proven to be highly successful, consolidated under the MRMC Commanding General all Army Medical Department assets that enhance the life-cycle management of medical materiel.

MRMC, which is headquartered at Fort Detrick, MD, manages medical materiel from early P6.1 research through test and evaluation, advanced development, fielding, maintenance and sustainment, and eventual retirement and modernization efforts for new equipment. MRMC has 13 subordinate commands with approximately 4,500 people inventing the future and maintaining the logistics readiness of the Army Medical Department.

MRMC's prime business areas are medical research, Army medical logistics, contracting, information management and information technology, advanced development, and management of Congressionally directed medical research.

Medical research laboratories comprise 6 of the 13 MRMC subordinate commands: Walter Reed Army Institute of Research (WRAIR); the Medical Research Institute of Infectious Diseases; the Medical Research Institute of Chemical Defense; the Research Institute of Environmental Medicine (and its detachment, the Center for Environmental Health Research); the Institute of Surgical Research; and the Aeromedical Research Laboratory. WRAIR has three OCONUS laboratories located in Bangkok, Thailand; Nairobi, Kenya; and

Heidelberg, Germany. MRMC works closely with the Navy Medical Research Center, especially in the area of infectious disease research. MRMC also leverages Navy facilities in Peru, Jakarta, and Cairo. The medical research program is spread over four major areas: infectious diseases, chemical and biological defense, military operational medicine, and combat casualty care.

Medical logistics is executed by three MRMC subordinate commands: the Army Medical Materiel Agency at Fort Detrick and the Medical Materiel Center-Europe in Pirmasens, Germany. They represent "focused logistics" at its best. Their missions range from peacetime logistics to the complex maintenance, sustainment, and modernization of our worldwide prepositioned equipment and maintenance and sustainment of our medical capability. The Health Facility Planning Agency manages Army medical facility needs by planning, programming, and contracting for construction of new medical treatment and research facilities.

The Medical Research Acquisition Activity, our contracting agency and another subordinate command, is an enterprise of excellence providing early consultation to the customer when the selection of an acquisition strategy and contract vehicle are critical. The follow-on negotiation of the contract vehicle and shared execution with the customer is accomplished with a large variety of contracts.

Advanced development is the forte of the Medical Materiel Development Activity, another subordinate command of MRMC. Its personnel have vast experience in bringing drugs, vaccines, medical devices, and medical equipment to the market. This activity works closely with

MRMC's principal investigators on clinical trials and provides the vital link between the technology base and the U.S. Food and Drug Administration. Its goal is to ensure that MRMC's products are fully licensed when they are fielded.

The Medical Information Systems and Services Agency is MRMC's medical information management (IM) and medical information technology manager. It provides IM support to the U.S. Army Medical Command (MEDCOM) and plans, programs, and executes the infrastructure (information technology) of the future.

The Telemedicine and Advanced Technology Research Center is part of MRMC with a strong focus on data transfer technologies that will change health care delivery behavior and medical business processes 10 to 20 years from now.

Congress has invested in MRMC to manage several major areas of medical research: breast cancer, ovarian cancer, prostate cancer, and neurofibromatosis to name a few. As a result, MRMC is the world's second largest single funder of breast cancer research.

MRMC selected six articles for this issue of *Army AL&T* that highlight innovative ways of managing medical materiel acquisition. As MEDCOM's materiel developer and acquisition expert, MRMC is an enthusiastic partner in acquisition reform. We are happy to have this opportunity to showcase our achievements and our ongoing efforts.

The essence of MRMC is its PEOPLE, all working together to invent the future, but making sure that our Service members are maintained, sustained, and protected, TODAY.

USING THE 'WEB' TO MANAGE THE MILITARY INFECTIOUS DISEASES RESEARCH PROGRAM

COL Rodney A. Michael, MC; LTC Coleen K. Martinez;
COL Lawrence K. Lightner; and COL Charles H. Hoke Jr., MC

Introduction

Visibility and control of the Military Infectious Diseases Research Program (MIDRP) are being significantly improved through use of a Web-based research management system developed by the U.S. Army Medical Research and Materiel Command (MRMC). The system solves potential problems in a variety of scenarios beyond those for which it was specifically designed.

The globally dispersed MIDRP is DOD's science and technology effort for researching methods to protect U.S. military personnel worldwide from naturally occurring infectious diseases. Research priorities include development of medical diagnostic tests, control measures against disease-transmitting insects, and vaccines and new drugs to prevent specific infectious diseases.

The Army is the lead Service responsible for the MIDRP. As such, MRMC laboratories conduct the research related to the program. Research is conducted primarily in eight military laboratories in both CONUS and OCONUS locations (figure on Page 4). Collectively, these laboratories are staffed with approximately 250 scientists that include Army, Navy, and Air Force military personnel; DOD civilians; contractors; and foreign military and civilian personnel.

Background

The Web-based management system initiative began in 1998 in response to the MRMC Commanding General's direction to improve accountability, prospective planning, and peer review of MRMC's medical research.

Prior to 1998, MIDRP research coordinators (senior experts appointed to coordinate research on a given topic or disease of interest) developed annual research plans based on their own vision and knowledge. These plans also included varying amounts of input from other investigators. Although the plans were circulated to laboratory commanders, there was no mechanism to identify investigators responsible for each project, evaluate results of research projects, or to ensure that lab commanders reviewed or approved research projects. Also, many investigators at the laboratories indicated that they were unaware of their responsibility for specific research projects.

During FY99, planning was initiated for an improved business process because of the increasing number of Internet users and Internet service providers around the world. As the first step in improving the process, the program director redefined the role of research coordinators. Instead of circulating research plans, coordinators formulated vision statements for required research based on research objectives. The program director then established a Web site that was accessible by all MIDRP laboratories and published the coordinators' vision statements on the Web site as solicitations for research proposals. This Web site, for the first time, provided the means for any interested scientist in any of the intramural laboratories to read the vision for research requirements and submit research proposals to compete for MIDRP funding.

A common research proposal structure was developed that required certain data elements to be entered or selected from menus. These include the following: project title; the proposal's solicitation requirement; project objective; research plan including background and methods; project costs; expected program contribution; principal and associate investigator names; literature references; a unique, database-generated proposal

Worldwide Military Infectious Diseases Research Program Laboratories

WWW.MIDRP.ORG
(This is a protected site.)

Walter Reed Army Institute of Research

U.S. Army Medical Research Institute
of Infectious Diseases

Naval Medical Research Center
(Primary Laboratories)
United States

Naval Medical Research Center
Detachment
Peru

Naval Medical Research Unit-3
Egypt

U.S. Army Medical
Research Unit
Kenya

Armed Forces Research Institute
of the Medical Sciences
Thailand

Naval Medical Research Unit-2
Indonesia

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identifier; laboratory commander's review and approval; external peer review results (including scientific merit score and reviewer comments); internal program relevance review results; and proposal prioritization rank. Finally, end-of-year progress reports for each proposal were added to the Web site. These reports included project status, results and conclusions, a statement of the contribution to MIDRP objectives, and external peer review results.

Perceived Needs

The Web-based business process was established to satisfy a number of perceived needs within the MIDRP. Communication among MIDRP personnel would improve because any scientist with Web site access privileges could immediately access all posted information. Research planning quality would improve as scientists and laboratory commanders actively participated and as external peer

reviews became an integral part of the process. The Web site would make MIDRP processes for project solicitation and funding more open, taking advantage of a wider range of scientists' creative energies. Attention to successfully completing funded projects would increase as scientists and their commanders became aware of the annual progress report requirement.

Privacy Process

Scientists working in DOD laboratories need to "protect" their creative ideas until they are funded and implemented. Privacy was maintained by employing password-controlled access to Web site pages based on a user's requirements. Web site access was also time-dependent, based on a detailed fiscal year research planning schedule, with each record requiring 3 fiscal years to complete.

Initially, the program director entered program objectives. Next, the research

coordinators could enter their vision for solutions (solicitations). Then, at a specified time, solicitations were locked, and scientists developed their proposed solutions (proposals), during which only the scientist and their supervisor could view proposal text. When the scientist submitted the completed proposal, the laboratory commander was permitted to view it and could either approve, disapprove, or request that the scientist modify the proposal.

Once approved by the laboratory commander, proposals were locked and peer review data were developed and entered. Next, steering committees were permitted to access the proposals, conduct a programmatic review, and recommend overall proposal rankings for future funding decisions.

During the execution year, investigators could view all research in progress to foster collaboration and creative thinking. However, access to peer review results

remained limited to the scientist and to those in the scientist's chain of command. At the conclusion of the fiscal year, scientists entered specific project reports. Similar to proposal submissions, reports were viewable by laboratory commanders for approval and were subsequently accessible by external peer reviewers for scoring and remarks. By controlling access according to a pre-published schedule, a highly coordinated planning process was established.

Technical Difficulties

After technical difficulties occurred, constant aggressive attention to the database was required to ensure that it functioned properly. The problems encountered fell into four categories: local, Webhost, programming, and personnel.

Investigators found problems associated with local Internet access and software incompatibilities. For laboratories abroad, Internet access was available, but reliability, bandwidth, and transmission line quality were not uniformly high. Hence, Internet accessibility varied significantly and some data losses occurred. Minor problems also occurred in ensuring that all investigators had correct versions of Internet browsers even though download was available from the site.

Problems occurred that were specifically related to the robustness of the host application server that had been chosen for the site. These problems involved the ability to successfully deal with a complex database, Web pages requiring many database calls, and high-traffic periods near deadlines when the system seemed to be overwhelmed. These problems were dealt with as they occurred and are further addressed by programming modifications for the next version of the Web site.

Minor programming issues interfered with a transparent user interface despite extensive testing by the programming team. Generally, these problems were corrected in real-time, but not without frustrating both program managers and users.

The program director's staff functioned as the help desk for investigators and thereby served as the principal interface between users and technical staff. During high-traffic periods especially, these individuals consumed their entire workday resolving problems, thus resulting in a significant drain on staff time. In the future, contractor personnel will be hired to staff the help desk. Presumably, after programming errors are corrected and users are more familiar with the site, the need for the help desk will decline.

Benefits

Several important interim benefits of MRMC's Web-based research management system have been observed. First, the research coordinators' program objectives and vision statements are available to all investigators. Second, the scientists' creative energies were stimulated, as shown by the proposal volume increase from 450 for FY00 to approximately 516 for FY01. Third, laboratory commanders can effectively preview research plans under their control and responsibility and influence their quality and scope. Fourth, peer review results were rapidly disseminated, facilitating decisionmaking and prioritizing and providing instantly accessible feedback to investigators. Fifth, the Web site provides managers program visibility and a means for tracking accountability. Finally, the decisionmaking process for funding proposals became open to and understandable by all scientists.

Because this system is relatively new, its long-term benefits are not yet known. These may include a more focused use of resources and improved results in tackling the difficult biomedical problems facing scientists. Managers recognize that an assessment cannot be made for at least 4 years.

This Web-based system serves as a model for distributed decisionmaking, where widely dispersed participants can work on established objectives or answer complex questions by collaborating in a thoughtful, deliberative process. The system was rapidly adopted by a parallel MRMC program, the Combat Casualty Care Research Program, indicating a degree of general application portability.

As a general model, such a system might also be useful in dealing with a problem requiring an *ad hoc* assembly of highly dispersed teams. For example, in the event of a bioterrorist attack in an urban environment, large numbers of casualties will have to be treated at various medical facilities. As such, a Web-based command site could be useful in monitoring the availability of hospital beds, doctors, and nurses to treat patients.

Conclusion

MRMC developed a Web-based program planning solution to meet specific requirements of a highly dispersed scientific program, the Military Infectious Diseases Research Program. This solution has facilitated MRMC program planning responsibilities and may lead to better resource usage in solving other military problems.

The Director, Military Infectious Diseases Research Program thanks the laboratory commanders, research coordinators, investigators, and contractors whose hard work, perseverance, and dedication made development and implementation of the new system a success.

COL RODNEY A. MICHAEL, MC, is the Deputy Director of the MIDRP at Fort Detrick, MD. He holds an M.D. from the University of South Dakota.

LTC COLEEN K. MARTINEZ is the Assistant Director of the MIDRP at Fort Detrick, MD. She holds a Ph.D. in immunology from Virginia Commonwealth University.

COL LAWRENCE K. LIGHTNER is the Associate Director of the MIDRP at Fort Detrick, MD. He holds a Ph.D. in parasitology from Iowa State University.

COL CHARLES H. HOKE JR., MC, is the Director of the MIDRP at Fort Detrick, MD. He holds an M.D. from the University of Rochester School of Medicine.

Innovative Science Management . . .

CONGRESSIONALLY DIRECTED MEDICAL RESEARCH PROGRAMS

LTC Kenneth A. Bertram, MC,
and COL Leslie A. Raulin, DC

Introduction

During the past decade, the Congressionally Directed Medical Research Programs (CDMRP) Office has pioneered innovative management strategies that are now being adopted by federal agencies. The CDMRP Office is an element of the U.S. Army Medical Research and Materiel Command(MRMC). MRMC manages several biomedical research programs that are included in Army and DOD budget submissions. These include core research programs (e.g., infectious diseases and combat casualty care) and a research program in telemedicine and advanced medical technologies. The CDMRP Office manages congressional special interest research programs that are not addressed in the core research programs or the telemedicine and advanced medical technologies research program.

The CDMRP Office originated from a unique partnership among the general public, Congress, and DOD. Grassroots advocacy organizations provided much of the impetus that led to congressional appropriations to DOD of $25 million and $210 million for FYs 92 and 93, respectively. These appropriations were targeted for breast cancer research. The CDMRP Office was created to manage these and future congressional appropriations for extramural peer-reviewed research.

The mission of the CDMRP Office is to control and ultimately eradicate specific diseases by fostering an environment that encourages innovative research, multidisciplinary approaches, and pursuit of novel ideas. During FYs 92-99, the CDMRP

Office managed more than $1.1 billion in appropriations for research on breast cancer, prostate cancer, ovarian cancer, neurofibromatosis, osteoporosis, and Defense women's health issues. During FY00, the CDMRP Office will manage programs with appropriations totaling more than $300 million. This article describes these programs and how they will be administered.

Flexible Management Process

While most federally funded medical research is funded on a long-term basis spanning many years, CDMRP's funding is based on single-year congressional appropriations. This is in contrast with continuous-year appropriations. Funds received by the MRMC for the CDMRP Office must be obligated by a specified date, and there are restrictions regarding how these funds can be spent. A skilled, multidisciplinary team of military and civilian scientists and clinicians, referred to as the Program Staff, manages CDMR Programs. To perform the administrative tasks related to these multiple programs, the Program Staff developed and refined a flexible 6- to 8-year execution and management process. This process accommodates all stages—from the development of an investment strategy through the completion of research grants for each congressional appropriation.

The first major milestone in the process is the development of an investment strategy. The Program Staff seeks the advice of an integration panel (an advisory committee composed of scientific and clin-

ical research leaders and consumer advocates) to establish an appropriate investment strategy for each program that meets the current needs of both the research and advocacy communities. For each program, a variety of award mechanisms are used to execute the investment strategy, which is advertised to the research community in a program announcement.

During the first or second fiscal year after an appropriation has been made, proposals are received, peer and programmatic reviews are conducted, and funds are awarded. During the third through sixth fiscal year, the research is performed and science management of grants is conducted. This involves reviewing annual and final reports, performing selected site visits, and disseminating research findings.

Two-Tiered Review Of Proposals

To fund the most meritorious and innovative research, the CDMRP Office developed a unique proposal review model based on recommendations from a 1993 report of the Institute of Medicine (IOM) of the National Academy of Sciences. In that report, *Strategies for Managing the Breast Cancer Research Program: A Report to the U.S. Army Medical Research and Development Command (1993) Committee to Advise the Department of Defense on Its Fiscal Year 1993 Breast Cancer Program,* the IOM recommended a two-tiered review procedure, composed of scientific (peer) review and a separate programmatic review, for research proposals submitted to the CDMRP Office. This two-tiered procedure, which is discussed

below, incorporates the strengths of traditional scientific review procedures and facilitates tailoring research proposals to achieve CDMRP Office goals.

Peer Review

Peer review is conducted by an external panel composed of scientific experts and consumer advocates. It is a *criterion-based* process whereby proposals are judged on their own scientific and technical merit based on established evaluation criteria. Proposals are evaluated individually during peer review while assigned reviewers highlight the merits and weaknesses of each proposal, focusing on such issues as scientific impact, rationale and research strategy, feasibility, and originality. This allows programmatic reviewers to accurately assess each proposal.

A unique scoring procedure is used to evaluate proposals during peer review. This procedure consists of assigning an overall global priority score and taking into consideration individual evaluation criteria scores. Evaluation criteria and assigned scores assist peer reviewers in determining an appropriate global priority score while providing the applicant, the programmatic review panel, and MRMC with a more informed measure of the proposal's quality, strengths, and weaknesses.

Programmatic Review

The programmatic review is also conducted by an external panel of scientific experts and consumer advocates. In contrast to the peer review, the programmatic review is a *comparison-based* process in which submissions from multiple disciplines compete within a common pool. The goal of programmatic review is to develop funding recommendations based on the ratings and recommendations of the peer review panel.

Consumer Inclusion

Another significant innovation of the CDMRP Office is the involvement of consumer advocates in the decisionmaking process. Consumers are individuals who have been affected by a particular disease and have a demonstrated interest in and knowledge of the disease. Consumer participation has enhanced the fulfillment of program objectives. Input from someone with firsthand experience with the target

disease ensures that the human dimensions of disease are incorporated into program policy, the investment strategy, and the research focus. A decision was made in 1994 to include consumer advocates on peer review panels in the Breast Cancer Research Program as part of the evaluation process. Based on positive feedback from both scientists and consumers involved in the initial process, consumer advocates are now included as full voting members on both peer and programmatic review panels of all CDMRP Office research programs.

In the dynamic world of science management, it is vitally important to foster partnerships among managers and scientists as well as those who are ultimately affected by policy and science. The partnership formed between scientists and consumers at the CDMRP Office serves as an example for other federal agencies.

Unique Award Mechanisms

One of the hallmarks of the CDMRP Office is its ability on a yearly basis to design or modify research initiatives that meet the changing priorities of the scientific and consumer communities. The CDMRP Office uses a variety of award mechanisms to best stimulate research aimed at eradicating specific diseases. These award mechanisms have enabled the CDMRP Office to fill unique niches and complement funding opportunities offered by other agencies.

One of the most innovative award mechanisms implemented by the CDMRP Office is the "idea award." The idea award mechanism was developed in response to the 1993 IOM report. Idea awards are quite different from traditional research awards, which are typically aimed at funding the expansion of already well-established avenues of research and usually require preliminary data. Idea awards are intended to fund novel, high-risk ideas that challenge existing paradigms and do not require any preliminary or pilot data.

Conclusion

In interpreting and executing congressional directives that accompany each appropriation, MRMC has acted with rigor and integrity. As a result, the programs under the purview of the CDMRP Office are scientifically sound, innovative, and responsive to the needs of the scientific and advocacy communities. MRMC and

the CDMRP Office have been praised by the IOM, which issued a report in 1997 titled *A Review of the Department of Defense's Program for Breast Cancer Research (1997) Committee to Review the Department of Defense's Breast Cancer Research Program.* The report stated that the IOM was favorably impressed with the efforts of the CDMRP Office and supported its continuation.

Based in part on information reported in scientific peer-reviewed journals, the research resulting from programs managed by the CDMRP Office is very impressive. Individual research projects have resulted in significant contributions in understanding the disease process, the development of therapeutics, and the improvement of quality of life.

Thanks to the tireless efforts of the CDMRP Office Program Staff, consultants, collaborators, and funded scientists, the CDMRP Office is achieving its mission. Each discovery broadens our knowledge base and brings us closer to eradicating disease and improving the health of our Nation. For more information about the CDMRP Office, see our Web site at **http://cdmrp.army.mil**.

LTC KENNETH A. BERTRAM, MC, is the Director of the CDMRP Office, MRMC. He holds an M.D. and a Ph.D. in microbiology from the University of Minnesota, Minneapolis.

COL LESLIE A. RAULIN, DC, is the Director for Congressional Programs and the Director for Dental Research at MRMC. Additionally, she is the former Director of the CDMRP Office. She holds a D.M.D. from the Harvard School of Dental Medicine and a Ph.D. in microbiology/immunology from the University of Maryland at Baltimore.

Military Medical Research . . .

ASSISTANCE AGREEMENTS AND ACQUISITION REFORM

Kenneth B. Connolly, Craig D. Lebo,
Dan E. Shackelford, and Michael D. Stitely

Introduction

The U.S. Army Medical Research and Materiel Command (MRMC) has dramatically increased its use of assistance agreements in support of both programmed research, development, test, and evaluation efforts and other medical research missions. Assistance agreements are defined as the transfer of a thing of value to a recipient to carry out a public purpose of support or stimulation authorized by a law of the United States (see 31 U.S.C. §6101(3)). Grants and cooperative agreements are examples of documents used in conveying the terms of assistance agreements.

In the early 1990s, MRMC awarded less than 100 assistance agreements to support research and development (R&D) programs. Since then, MRMC has written 3,000-plus assistance agreements totaling more than $1 billion. In 1993, Congress appropriated a supplemental spending bill of slightly more than $200 million. These dollars were specifically earmarked for research aimed at early and accurate detection, treatment, and prevention of breast cancer. The task of managing the funds to achieve the goals of Congress fell to MRMC, DOD's largest medical research organization. It was clear to MRMC's procurement strategists that the most efficient way to distribute these funds to civilian researchers would be through assistance agreements. Similar appropriations for targeted medical research have followed each year since 1993.

Assistance Agreements

By devising this approach to Congressionally mandated programs, MRMC was able to successfully shift its paradigm from contracting as the tool of choice for extramural medical research to assistance agreements as the tool of choice. Today, nearly all MRMC extramural research is supported with assistance agreements. In FY99, the U.S. Army Medical Research Acquisition Activity (MRAA) issued more than 560 grants and 46 cooperative agreements to support basic research totaling more than $300 million, while it issued only 42 contracts for research during the same period.

Assistance relationships continue to grow in importance and use within the Army R&D community. The statutory basis for the Army (and DOD at large) using assistance agreements is codified in 31 U.S.C. §63 dated 1982.

A more liberal use of assistance agreements will increase the Army's ability to target fledgling markets or products that have the best potential for meeting the future needs of the Army.

A grant is a legal instrument used to convey the assistance agreement between the U.S. government and a state or local government or other recipient. It is defined as follows in 31 U.S.C. §6304:

• The principal purpose of the relationship is to transfer a thing of value to the state or local government or other recipient to carry out a public purpose of support or stimulation authorized by a law of the United States instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit or use of the U.S. government.

• Substantial involvement is not expected between the executive agency and the state, local government, or other recipient when carrying out the activity contemplated in the agreement.

Cooperative agreements are almost identical in definition to grants, except that conditions exist where substantial government involvement may be necessary (31 U.S.C. §6305).

Neither 31 U.S.C. §6304 nor 31 U.S.C. §6305 is sufficient to permit the use of assistance agreements. Both statutes require that some specific, additional legislative authority must exist before a federal agency can enter into an assistance agreement. For DOD, this additional authority is in 10 U.S.C. §2358, *Research and Development*, 1962, which originally authorized DOD to perform R&D projects by contract. Later, 10 U.S.C. §2358 was amended to add "by grant" as a means to support the DOD R&D mission. It was

further amended by adding "or cooperative agreement" to the definition.

DoD 3210.6-R, *Department of Defense Grant and Agreement Regulations*, Part 22, Subpart C, *Competition*, requires that assistance relationships be awarded competitively. The mechanisms established in Federal Acquisition Regulation 6.102 on Broad Agency Announcements (BAAs) have generally been applied to the assistance community. DoD 3210.6-R, Subsection 22.315, directs that competition be established through merit-based competitive procedures that include issuance of BAAs and the peer or scientific review process.

It is anticipated that the push for partnering, coupled with the expected reduction in the number of contracting and acquisition professionals, will mandate the use of more assistance agreements instead of contracts. A more liberal use of assistance agreements will increase the Army's ability to target fledgling markets or products that have the best potential for meeting the future needs of the Army. They may even provide incentives for firms and individuals to conduct research in waning or limited markets where the only customer is the military.

Electronic Technology

Electronic commerce technology will likely enable the electronic submission of proposals for evaluation for potential funding. The electronic proposal will then serve as the foundation for an electronic award instrument. During the past 2 years, a DOD process action team convened to define the electronic data

In the military medical research arena and throughout the federal acquisition community, assistance agreements are becoming more important because of their ability to enhance true partnering between federal and commercial enterprises and to obtain ideas from markets or groups rather than from a single firm.

necessary for proposal submission and, more importantly, for award transmission to the recipient and the customer base, including the Defense Finance and Accounting Service. It is believed that the award instrument will not only continue to evolve in its simplicity and streamlined nature, but will actually gravitate toward a single, standard, one- to two-page award instrument that will be used DOD-wide.

Conclusion

In the military medical research arena and throughout the federal acquisition community, assistance agreements are becoming more important because of their ability to enhance true partnering between federal and commercial enterprises and to obtain ideas from markets or groups rather than from a single firm. The future of assistance agreements is linked inextricably to acquisition reform. As with contracting, the appropriate use of assistance agreements is a necessary part of the procurement professional's role of providing a legal agreement meeting the demands of cost, quality, and cycle time.

KENNETH B. CONNOLLY is MRMC Principal Assistant Responsible for Contracting and the Director of MRAA. He is Defense Acquisition Workforce Improvement Act (DAWIA) Level III certified in both contracting and manufacturing and production. He has more than 25 years experience in acquisition and contracting. Connolly has a B.S. degree from the University of Bridgeport, Bridgeport, CT, and an M.B.A. from the University of Phoenix, Phoenix, AZ.

CRAIG D. LEBO is the Deputy for Acquisitions, MRAA. He has worked in Army contracting for the past 17 years. Lebo has a B.A. degree in liberal arts from Indiana University of Pennsylvania and an M.A. in humanities from Hood College.

DAN E. SHACKELFORD is the Deputy for Acquisition Policy Support, MRAA. He has 18 years experience in contracting with the Army and the Navy. He holds a B.S. degree in biology from DePaul University and an M.S.E. degree in technology management from the University of Pennsylvania.

MICHAEL D. STITELY is the Chief of Procurement Analysis Branch, MRAA. He has worked in both civilian and Defense contracting for more than 30 years. He holds a B.S. degree in business from the University of Maryland and is currently working toward an M.S. degree in management sciences from LaSalle University.

MILITARY INNOVATIONS IN BIOMEDICAL RESEARCH MANAGEMENT

Jay Winchester

Introduction

Historically, the U.S. Army Medical Research and Materiel Command (MRMC) and the Army medical research establishment in general have been involved in developing or improving on some fundamental and very important biomedical research and development (R&D) management tools and concepts. For example, the Army played a significant role in modernizing and more broadly applying the informed-consent and peer-review concepts to government-funded medical research. Additionally, newer concepts associated with the use of humans in medical research and the solicitation and evaluation of proposals for medical research funding are direct results of MRMC's innovative management of research programs.

Informed Consent

The doctrine of informed consent is steeped in history. Plato described the practical value of telling patients about the benefit expected in an extended treatment regimen as an inducement for the patient to cooperate with the physician. However, the doctrine of informed consent related to research was not articulated in writing until the post-World War II Nuremberg Tribunal pronounced judgment on the individuals responsible for Nazi atrocities committed in the name of medical research. The "Nuremberg Code" was promulgated by a military tribunal and drafted by a U.S. Army lawyer. The Nuremberg Code's 10 points remain the ethical bedrock for medical experimentation involving humans.

Innovations

The military biomedical community has developed additional innovative and useful practices concerning the use of humans in research. For example, the Army developed the concept of using a medical monitor who serves as a safety advocate for medical research volunteers. The medical monitor has the authority to terminate or suspend a research effort and has other responsibilities that are specified by an institutional human-use committee. This medical monitoring ensures effective informed consent and safety of research volunteers, especially in unusual research protocols.

Another military innovation is the two-tier model for reviewing research protocols for compliance with laws and ethics governing the use of humans in research. In the Army, a local institutional-review board performs the initial review of a protocol. The Human Subjects Research Review Board (HSRRB) performs the second-level review on behalf of the Army Surgeon General. This two-tier review process has the advantage of being able to focus on

By including on the Human Subjects Research Review Board individuals with firsthand experience in diseases being studied, the military biomedical research community gains perspective, empathy, and a sense of urgency, thus ensuring that the human dimensions of disease are incorporated into the informed-consent process.

the actual informed-consent process for each individual research protocol.

Since the early 1980s, the Army has had a policy of providing free medical care for research subjects who are injured as a proximate result of their participation in Army-sponsored research. This policy seems appropriate for research intended to enhance military readiness, but may be less appropriate for clinical trials or protocols unrelated to military readiness.

Finally, the Army has taken a lead role in incorporating consumer advocates into the human-use review process specifically and into R&D decisionmaking processes in general. By including on the HSRRB individuals with firsthand experience in diseases being studied, the military biomedical research community gains perspective, empathy, and a sense of urgency, thus ensuring that the human dimensions of disease are incorporated into the informed-consent process.

Peer-Review Concept

Perhaps the most fundamental modern concept in science management is peer review. Peer review has many meanings. Its earliest and most common meaning is related to the editor's practice of having "specialists" review scientific manuscripts prior to publication to ensure quality. For contemporary biomedical researchers, peer review is a key process used in the selection of projects for funding by the federal government via grant or contract. This latter meaning had its first sustained large-scale application during World War II under the leadership of Dr. Vannevar Bush. (Bush was the Director of the Office of Scientific Research and Development during World War II.)

The mass production of penicillin, a major peer-reviewed World War II project, may be considered in part a benefit of peer review because of its importance as

For contemporary biomedical researchers, peer review is a key process used in the selection of projects for funding by the federal government via grant or contract.

a war project. During World War I, the death rate from pneumonia in the American Army totaled 18 percent. In World War II, the death rate fell to less than 1 percent.

Military biomedical efforts during the war era left an indelible mark on the peer-review concept. Eventually, peer review was defined as the review of research project proposals by experts, the separation of such expert review from program management, the grading of project applications according to a fixed scale, and the exclusion of experts from voting on proposals affecting an institution that paid their salary. This definition of peer review endures not only for the military biomedical community but also for the R&D community overall.

Procurement Mechanisms

More recently, MRMC played a key role in developing the Broad Agency Announcement (BAA) as a flexible procurement mechanism designed to meet statutory requirements for competition. Originally, MRMC published its BAA annually or biannually. The BAA described general areas of research interest, contained uniform directions for proposal submissions, and did not specify deadlines for proposals. Submission of pre-proposals was added to reduce proposal costs to investigators.

Proposals are subjected to external peer review by a panel of experts convened by a contractor. Proposals of sufficient scientific merit are then subjected to programmatic review, usually in-house. Today, program announcements are issued as needed for Congressionally directed research and, although they follow the general pattern described above, they are evolving in many different directions.

The BAA and similar procurement mechanisms are now a staple for extramural government grant programs indicating military leadership in innovative biomedical research management.

Conclusion

One final innovation deserves mention. In the decades prior to passage of the *Federal Technology Transfer Act*, MRMC entered into numerous "No-Dollar Agreements" with corporations and academic institutions. These agreements allowed Army scientists to work collaboratively with industry or academic colleagues when the interest of the Army coincided with those of the civilian research organization. An example is the antimalarial drug mefloquine that was co-developed by the Army and a pharmaceutical manufacturing company under a No-Dollar Agreement. No-Dollar Agreements have since been replaced with "Cooperative Research and Development Agreements" authorized by the *Federal Technology Transfer Act*. However, the rich heritage of MRMC's experience with No-Dollar Agreements has enabled the command's Technology Transfer Program to continue to flourish.

JAY WINCHESTER is Senior Counsel at MRMC. He has a B.A. from the University of Minnesota and graduated from the Hamline University School of Law.

MAINTAINING THE HEALTH AND WELL-BEING OF SENIOR LEADERS IN THE ARMY THROUGH MEDICAL RESEARCH

MAJ Carl A. Castro, Dr. Amy B. Adler, Ann H. Huffman,
and COL Gregory Belenky, MC

Introduction

Although senior Army leaders are critically important to the success of military operations, they have only been studied in terms of their personalities and leadership styles. Further, the information obtained from these studies was used primarily for the selection and training of future Army leaders. Surprisingly, the systematic investigation of senior leaders themselves has received very little attention. Yet the workload and responsibilities of Army senior leaders are arguably the highest of any single military group. Senior leaders must maintain cognitive readiness to maximize their performance and well-being during periods of heavy workload and high-operational tempo.

As such, a study was conducted in Europe by the authors of this article, with COL Belenky serving as scientific advisor. The data presented in this article were collected between May and December 1999. The objective was to address four fundamental aspects of senior leadership environment and performance: to characterize the workload (or personnel tempo) of senior Army leaders; to develop a descriptive summary of their health; to measure how much sleep senior leaders receive by having them wear an actigraph monitoring device; and to identify relationships between workload and well-being, focusing on how senior leader performance and well-being could be optimized during periods of heavy workload and high operational tempo. The assessment methods and initial findings of this research are briefly summarized in this article.

Defining Senior Leaders

Senior leaders were operationally defined as commanders who served at the battalion level or higher and those officers in the rank of colonel or general officer who occupied key staff positions at the division level or higher. Junior leaders were primarily first and second lieutenants serving as platoon leaders as well as captains serving in company-level commands, which included company, troop, and battery commanders.

Methods Of Assessment

Multiple methods of assessment were used. Initially, senior leaders completed a survey asking about their work habits, stressors, health, well-being, and family commitments. Next, senior leaders were interviewed, focusing on the challenges and stressors of their current job and how they cope with these challenges. Finally, senior leaders were asked to wear two monitoring devices (photo on Page 13). The actigraph monitoring device measures activity that can be used to accurately determine sleep and wake periods. Worn on the wrist, this device provides data to estimate the effect on subsequent performance. The BootStrike monitoring device, worn on the subject's boot, measures the amount of time that the wearer's foot is in contact with the ground. Given a person's body weight and foot contact time, caloric expenditure during physical activity can be accurately determined. Both of these devices were worn between 60 and 90 days, during the normal course of the senior leaders' duties.

Initial Findings

To date, 12 male senior leaders have been assessed. Collected data were compared to data from 46 junior officers. Senior leaders in the initial sampling were all married, had a mean age of 48 years, and averaged 25.4 years of military service. Relative to junior leaders, 53 percent were married, had an average age of 30 years, and averaged 7.6 years of military service.

Workload. While senior leaders participated in more military deployments than junior leaders (7.8 deployments vs. 1.6 deployments), the deployment load (i.e., the number of deployments averaged across years of military service) of the two groups were the same. However, senior leaders reported a higher personal workload than junior leaders. Analyses indicated that senior leaders reported working more hours per day than junior leaders (13.6 hours vs. 12.0 hours) and more days per week (6.7 days vs. 5.5 days). In addition, senior leaders reported losing more leave time in the previous 12 months than junior leaders (8.3 days vs. 1.9 days).

Stressors. The most frequently reported stressors for senior leaders was lack of time for personal health and fitness (rated as a high or very high stressor by 58.3 percent of the senior leaders); yet on

average, senior leaders exercised for at least 30 minutes per day four times a week. This amount of exercising was similar to that of junior leaders.

The second highest stressor for senior leaders was responding to e-mail (rated as a high or very high stressor by 41.7 percent). Within the context of high workload, senior leaders reported that their families were a source of very little conflict with their work responsibilities. Senior leader scores on the Family-Work Conflict Scale were significantly lower than junior officers. In contrast, there was no difference on the Work-Family Conflict Scale (or the degree to which work interferes with family life) between the two groups. In fact, both senior and junior leaders reported that their work schedules significantly interfered with family commitments and obligations.

Health. In terms of other health outcomes, senior leaders reported sleeping an average of 5 hours and 50 minutes per night, while junior leaders reported sleeping an average of 6 hours. Senior and junior leaders did not differ in their psychological or physical well-being. The physical symptom most reported by senior leaders was back problems. In terms of morale, most senior leaders reported high or very high personal morale and motivation (83.3 percent on both items), while only 53 percent of the junior leaders reported high or very high morale. In contrast, only a third (33.3 percent) of the senior leaders reported high or very high levels of energy compared to almost two-thirds (60.8 percent) of junior leaders.

Pace of Operations. Not surprisingly, these findings confirm that the workload of senior leaders in the U.S. Army, Europe is exceedingly high, with senior leaders working nearly 14 hours a day, 7 days a week. Given such an intense work schedule that does not allow for a recuperative period, it is not surprising that senior leaders report that, although their motivation is high, their level of energy is not. However, this pace of operations did not appear to produce any immediate ill effects on either their psychological or physical health. Overall, the health of senior leaders is good. However, the evidence indicates that their quality of life is diminished. Senior leaders have or take very little time off for anything that is not

Monitoring devices

mission-related. Given the amount of time that senior leaders (and junior leaders) spend engaged in military-related tasks, clearly their commitment to the mission and the organization creates a situation in which they structure their lives to meet the needs of the military first rather than their personal or family commitments.

Future Work

Further research on senior leadership issues and workload and medical readiness issues will focus on integrating the quantitative data from the survey instrument (reported here) and the actigraph and BootStrike monitors with qualitative interview data; exploring how the relatively high workload of junior leaders impacts their overall well-being, and focusing on how the current operational tempo is affecting their career intentions; expanding the present investigation of workload and health assessment to include noncommissioned officers, specifically command sergeant majors and first sergeants; and developing a research model to determine how war planners (staff officers) are specifically affected by the high pace of operations in the U.S. Army, Europe. The latter is particularly relevant in relation to staff officers engaged in operational planning of current military missions. This systematic approach to investigating the rela-

tionships between workload and medical readiness will contribute significantly toward ensuring that the health and well-being of our leaders remain high at all levels.

MAJ CARL A. CASTRO is Commander of the U.S. Army Medical Research Unit-Europe. He received his B.A. from Wichita State University, and his M.A. and Ph.D. from the University of Colorado.

DR. AMY B. ADLER is a Science Coordinator with the U.S. Army Medical Research Unit-Europe. She received her B.A. from Brown University and her Ph.D. from the University of Kansas.

ANN H. HUFFMAN is a Principal Investigator with the U.S. Army Medical Research Unit-Europe. She received her B.S. from San Diego State University, her B.A. from the University of Maryland University College, and her M.Ed. from the University of Maryland, College Park, MD.

COL GREGORY BELENKY, MC, MD. is the Director of the Division of Neuropsychiatry, Walter Reed Army Institute of Research. He received his B.A. from Yale University and his M.D. from the Stanford University School of Medicine.

RE-ENGINEERING MEDICAL ASSEMBLAGE MANAGEMENT

Deborah E. Kramer

Introduction

The U.S. Army Medical Research and Materiel Command (MRMC) and the Army Medical Department Center and School are exploring the Mission Defined Unit Assemblage (MDUA) concept as an adaptive strategy to enable Army medical units to support the continuum of military missions.

Army medical units are equipped with a number of medical assemblages (sets, kits, and outfits) consisting of consumables, durables, and equipment primarily focused on supporting combat casualty care (major trauma suffered as a result of conventional warfare). The Army vision, which calls for strategic dominance across the entire spectrum of operations, requires units to be prepared for all types of possible missions. This includes major theater wars, peacemaking and peacekeeping, humanitarian assistance, and disaster relief.

The Army vision presents medical unit commanders with a unique challenge: support full-spectrum missions with medical assemblages intended to support combat casualty care. Most medical assemblages are incapable of supporting pediatric, geriatric, gynecologic, and obstetrics patients; patients suffering from internal parasites and nutritional deficiencies; or patients with infectious diseases and chronic conditions not commonly seen in U.S. soldiers. Thus, the deployed unit arrives for operations with supplies and equipment unsuitable for humanitarian assistance, disaster relief, peacekeeping, or any other Stability and Support Operation (SASO). By far, SASO missions account for the majority of missions presently performed by U.S. forces.

Current Process Shortfalls

Today's medical assemblage management process has several well-documented shortfalls. For example, those responsible for executing and sustaining the process (Service-level managers and logisticians) are detached from those who conceive and develop the requirements (Joint Readiness Clinical Advisory Board and Combat Developers). The unit that receives an assemblage does not become involved in the assemblage's life cycle until the fielding process begins. Additionally, the life cycle of an item of medical materiel, which may range from 12 months to 11 years, is not considered when designing a unit assemblage.

The current process is not cost effective. For instance, with very few exceptions, today's units must maintain all medical equipment required by their authorization documents. Consequently, many equipment items become obsolete or nonsupportable after fielding. The resulting sustainment cost of a medical assemblage can be two to three times the original acquisition cost.

The Army Transformation Strategy and Joint Vision 2010 require tailored packages, rapid response and distribution, a reduced logistics footprint, and reduced response time. Our current assemblage management practices do not support these requirements.

Another shortfall of the current process is that units deploy with their authorized medical assemblages to support SASO missions. However, soon after arriving in their area of operations, units replace much of their authorized equipment with equipment and supplies required to support humanitarian assistance, disaster relief, peacekeeping, or peacemaking. Again, this is a waste of diminishing financial resources.

Mission Defined Unit Assemblages

As noted earlier, today's units are required to maintain all authorized materiel. This is referred to as the "just-in-case" model of medical assemblage

The Mission Defined Unit Assemblage concept provides the process, structure, and control required to ensure readiness and provides unit commanders and healthcare providers with the flexibility they need to accomplish diverse mission objectives.

management. To support the objective force resulting from the Army's transformation, medical units must move to a "just-enough/just-in-time" model for medical assemblage management. This model requires the Army to balance the risk associated with having lower on-hand quantities of medical materiel with the ability to obtain medical materiel from the commercial sector. Commercial sector and military transportation capabilities must also be taken into account.

The MDUA concept provides the process, structure, and control required to ensure readiness and provides unit commanders and healthcare providers with the flexibility they need to accomplish diverse mission objectives. An MDUA has two components: a mandatory component ("war core") and a discretionary component. The war core consists of items not readily available in the commercial sector, items essential for readiness and training, and those items requiring "hardening" to function in a field environment. Examples include items used only by the military, such as field litter carriers; and high-cost items with long manufacturing lead times, such as X-ray units.

The discretionary component includes items readily available and most frequently used in the U.S. healthcare industry, and those items more effectively managed by a central organization. Discretionary components are selected based on the specific requirements of a unit's mission and include pharmaceuticals, surgical instruments, and other medical items that rapidly become obsolete and nonsupportable.

MDUA Development

The decision about what becomes a part of the war core and what becomes part of the discretionary component of the MDUA is based on capability and risk assessments. The capabilities that must be evaluated include equipment technology life cycles, clinical practice standards, commercial sector availability, life-cycle cost, sustainment and training requirements, field survivability, and the possibilities for central management. Medical assemblage requirements are determined based on direct knowledge of

the commercial healthcare system. Items selected for inclusion in medical assemblages are those most frequently used by the U.S. healthcare industry. This ensures that the item and its repair parts are available when needed, and that it is the same item used by military medical clinicians practicing at installation medical treatment facilities.

The MDUA concept is scalable. That is, it allows for the units most likely to deploy for a combat mission to have most of their assemblages on hand and configured for combat casualty care. The concept also allows for late deploying units and those least likely to deploy to be capable on short notice of outfitting and supporting any military medical mission.

Mission Execution Using MDUAs

The unit commander and unit healthcare professionals will use a simulation and modeling tool to plan for the materiel requirements of specific missions. The simulation tool will help them evaluate specific scenarios, taking into consideration the following: unit war core materiel, specific mission profiles, medical intelligence estimates, implied mission tasks, anticipated patient streams, expected patient conditions, healthcare provider specialties and materiel preferences, local epidemiology, indigenous populations, local infrastructure, evacuation times, etc. The simulation tool is used to analyze the factors influencing the scenario and provide the commander with a recommendation for component materiel requirements.

Ultimately, the commander and unit healthcare professionals determine what materiel will be used for the mission. After the materiel requirements are identified, the unit decision support system will be used to search the Joint Medical Asset Repository (JMAR) for sources of the materiel required but not present in the unit's war core. The JMAR, currently under development, will provide visibility for medical materiel assets on hand in units, stored centrally as Defense Logistics Agency or Service-owned stock, or available from the commercial sector.

Required materiel could be in another military unit's possession, stored as vendor-managed inventory, contracted

as prime vendor surge, or included in corporate exigency contracts that allow access to a manufacturer's full line of products. Online ordering will allow a unit to procure the discretionary portion of its MDUAs prior to deployment, functionally packed and ready for use, thus ensuring full-mission capability on arrival in the area of operations.

Conclusion

The strategy to procure and issue to units only what is needed to meet readiness and training requirements provides a great opportunity for cost avoidance. Cost reductions are achieved through avoiding initial investment costs and life-cycle sustainment costs. The dollars preserved through the use of the MDUA concept can be used to recapitalize Army medical units. This ensures a modernization process and standards of patient care that keep pace with our installation medical treatment facilities.

The new Army vision calling for strategic dominance across the entire spectrum of operations places unprecedented challenges on all Army units. As such, future Army medical units must be prepared to support a broad range of missions while being more responsive, deployable, agile, versatile, survivable, and sustainable. Application of the Mission Defined Unit Assemblage concept offers a strategy to meet these challenges.

DEBORAH E. KRAMER is a Logistics Management Specialist for MRMC. She has completed the Defense Logistics Agency's Medical Military Internship Program and the U.S. Army Medical Materiel Agency's Medical Logistics Management Course, and is a graduate of Kutztown University of Pennsylvania.

ADAPTING THE DOD ACQUISITION PROCESS TO THE DYNAMIC ENVIRONMENT OF BIOLOGICAL DEFENSE VACCINE ACQUISITION

BG Eddie Cain,
Richard B. Paul, and
Dr. Stephen D. Prior

Introduction

Fielding safe and effective biological defense (BD) vaccines to protect U.S. military forces is of major importance to DOD and the ultimate goal of the Joint Vaccine Acquisition Program (JVAP). To achieve this goal, the Army established a project management office (PMO) that routinely works with a prime systems contractor (PSC) to ensure timely licensing of all promising vaccines by the U.S. Food and Drug Administration (FDA).

Chartered in June 1998, the JVAP PMO has been at the forefront in managing the process required to ensure the success of the JVAP. Specifically, the PMO is responsible for integrating DOD acquisition requirements with FDA regulations. DOD acquisition requirements are outlined in the DoD 5000 series of directives, while FDA regulations regarding safe and effective products are contained in 21 Code of Federal Regulations (21 CFR). Additional information on the management challenges associated with the JVAP was published in an article beginning on Page 11 of the July-August 1998 issue of *Army RD&A* magazine.

Program Management

At the heart of the JVAP is the prime systems contract approach, which was directed by the Under Secretary of Defense for Acquisition and Technology (now Under Secretary of Defense for Acquisition, Technology and Logistics) in May 1995. DynPort Limited Liability Co. (LLC) is the current PSC. DynPort LLC is a joint venture between DynCorp in Reston, VA, and Porton International, London, UK. As PSC, DynPort is responsible for all aspects of developing the assigned BD vaccines. DynPort secures, integrates, and manages multifarious tasks such as providing the manufacturing facilities, regulatory affairs and clinical research expertise, storage and distribution services, earned value management systems support, and all other functions associated with developing, producing, testing, and FDA licensing of BD products.

The FDA requires that all products licensed for human use are produced consistent with a quality specified and approved in the specific Biologic License Application (BLA). Furthermore, the FDA requires that each product be proven safe and effective through appropriate testing. Achieving FDA product licensure and maintaining the license require regulatory compliant facilities, staff, and processes for each step in the licensing process. Knowledge of the process and FDA expectations (including the ever-evolving regulatory requirements) is crucial to the success of the program.

Since the contract was awarded, DynPort has sought state-of-the-art capabilities from subcontractors already familiar with the needs of the JVAP. These subcontractors must be well informed about FDA regulatory compliance requirements. Additionally, they must be informed about and adhere to DOD's distinct procedural and contract requirements, e.g., Acquisition Milestone Reviews, Earned Value Management, the National Environmental Protection Act, and the Biological Defense Safety Program.

DynPort has initiated integrated product and process development through the formation of product development

Fielding safe and effective biological defense vaccines to protect U.S. military forces is of major importance to DOD and the ultimate goal of the Joint Vaccine Acquisition Program.

teams (PDTs) composed of in-house and subcontractor personnel from requisite technical and business areas associated with vaccine development and manufacture. In keeping with the integrated product team (IPT) concept, DynPort's PDTs draw on expertise from all stakeholders, including the government and those in industry who have been most successful in contract performance. Furthermore, consistent with pharmaceutical industry standards, DynPort ensures that JVAP draws from the best organizations in the United States and abroad.

To complement the organizational initiatives undertaken by DynPort, the JVAP PMO recently instituted its own initiatives. One is having the JVAP's Milestone (MS) Decision Authority, the Joint Program Manager for Biological Defense, establish an overarching IPT. This IPT will expand the level of joint expertise in overseeing the JVAP and the PSC and ensure that key government stakeholders are involved in the program.

Just as DynPort sought to team with world-class contractors, so has the government. The JVAP PMO has entered into agreements with other government agencies to enhance its capabilities to advise, assist, and support the PSC. These agencies include the U.S. Army Medical Research and Materiel Command (MRMC), the National Cancer Institute of the National Institutes of Health, and the U.S. Army Soldier Biological and Chemical Command.

The DOD Acquisition Life-Cycle Process

The management initiatives outlined above are only the first ones in the overall effort to improve the JVAP's efficiency and effectiveness. An additional initiative involves adapting the DOD acquisition life-cycle process to the regulatory requirements in 21 CFR. The fundamental challenge is shortening the timelines associated with acquiring biologic products by applying DOD's systems acquisition process while strictly complying with FDA regulations.

The JVAP implements this systems acquisition process via DoD 5000.2-R (*Mandatory Procedures for Major Defense Acquisition Programs*) but, at the same time, harmonizes the regulatory requirements in 21 CFR. Each of the vaccines on contract with the PSC and other candidate vaccines still in the technology base follow a logical progression through the following formal acquisition phases: concept exploration, program definition and risk reduction, engineering and manufacturing development, and full-scale production. The accompanying figure shows the generic vaccine development schedule. For more information about this process, refer to the July-August 1998 *Army RD&A* article cited earlier.

Manufacturing consistency begins

Generic Vaccine Development Schedule
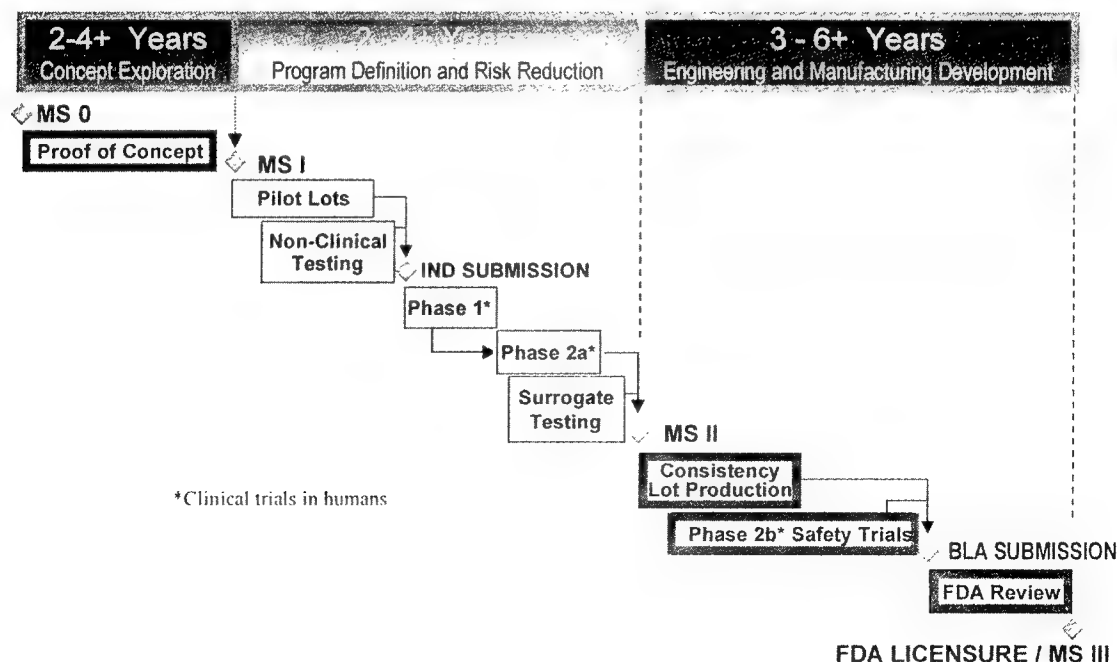
2-4+ Years
Concept Exploration

Program Definition and Risk Reduction

3 - 6+ Years
Engineering and Manufacturing Development

MS 0

Proof of Concept

MS I

Pilot Lots

Non-Clinical Testing

IND SUBMISSION

Phase 1*

Phase 2a*

Surrogate Testing

MS II

Consistency Lot Production

*Clinical trials in humans

Phase 2b* Safety Trials

BLA SUBMISSION

FDA Review

FDA LICENSURE / MS III

IND: investigational new drug

> *JVAP must develop technology transfer and scale-up procedures to ensure that the product retains the desirable vaccine characteristics during transition from the laboratory to the licensed manufacturer.*

with a thorough understanding of the product and its manufacturing process. One significant difference between the JVAP and other Defense acquisition programs is that the acquired product also requires an FDA-approved manufacturing process. The link between the product and the manufacturing process must be established very early in the development cycle, sometimes while the product is still in the technology base. JVAP must develop technology transfer and scale-up procedures to ensure that the product retains the desirable vaccine characteristics during transition from the laboratory to the licensed manufacturer. This requires an unprecedented relationship between the PSC and those in the technology base who are associated with a vaccine's concept exploration phase. In the United States, this technology base is at the MRMC. In addition, the developer and the manufacturer must work closely with the FDA to determine any intrinsic defects in the product that could lead to rejection of the BLA, even if clinical studies demonstrated safety and efficacy. Initial concerns could be related to the starting materials (seed stocks) or the manufacturing steps as biological products are defined by the seed stocks and the manufacturing process.

A Paradigm Shift

Similar to the vaccine's success, JVAP's success depends on early and continuous interaction between those in the technology base and the PSC. Unlike typical DOD acquisition programs, biologic product development requires the eventual product manufacturer's early involvement in the vaccine's development. Therefore, the PSC, who presents these vaccine products to the FDA and becomes the licenseholder, must interact with the organization responsible for the vaccine's research and early development. In most cases, this is the U.S. Army Medical Research Institute of Infectious Diseases, a subordinate organization of MRMC. Both are located at Fort Detrick, MD.

The PSC and those in the technology base share their technical expertise with each other and with their subcontractors. The PSC ensures program success by becoming actively involved in the latter stages of a product's concept exploration phase and prior to official transition of the product at MS I. Furthermore, those in the technology base must maintain a close association with the product after transition to advanced development. This ensures that the scientists most familiar with a product's early research can help address potential problems. This close association creates an "engineered" product for FDA licensing and allows the

product to move efficiently through advanced development. Additionally, several iterative stages among the organizations take place, including information exchanges and the exchange of candidate products for testing. This paradigm shift requires that the contractor PDTs and government IPTs facilitate the acquisition process through the empowerment and cooperation of team participants.

Conclusion

This article describes the flexibility of DOD's acquisition process to accommodate vaccine development and production. In particular, the JVAP Office employs extensive acquisition and technical expertise to optimize vaccine development and to ensure FDA approval. Although this is a challenging assignment for both the government PMO and the industry PSC, U.S. military forces are the ultimate beneficiaries.

BG EDDIE CAIN is the Joint Program Manager for Biological Defense. He was commissioned through the Army ROTC Program at Jackson State University in 1971 and has attended both the Army Command and General Staff College and the Army War College.

RICHARD B. PAUL is the Acting Project Manager, Joint Vaccine Acquisition Program, at Fort Detrick, MD. He holds B.A. and M.A. degrees from East Carolina University, Greenville, NC.

DR. STEPHEN D. PRIOR is the President and CEO of DynPort Limited Liability Co., Herndon, VA. He holds a B.S. from the University of Kent, UK, and a Ph.D from the University of Warwick, UK.

Editor's Note: An article discussing the Army Science Board's contributions to transforming the force appeared in the March-April 2000 issue of Army AL&T.

Introduction

Why does the Army have an Army Science Board (ASB)? What are the ASB's functions? Who are its members? Who do members report to? What contributions have members made to the Army? These may be some of the questions from those unfamiliar with the ASB.

The ASB is one of the Army's most esteemed organizations composed of individuals who continually make significant contributions to the Army. ASB members and consultants are the epitome of one of the Army's core values—selfless service to the Nation. They have never faltered from executing the ASB's central role of providing independent outside advice on future technological trends and other warfighting issues to the Army's most senior leaders.

Mission

The ASB's mission is to provide the Army with a resource of world-class scientists, engineers, technologists, and operational experts as well as business, policy, and managerial specialists who volunteer their expertise and time to address those critical national security challenges for which the Army's leadership seeks independent and unbiased technical advice. The ASB focuses on issues of importance to large segments of the Army, and its "products" are delivered in a candid, timely, and tailored fashion.

Organization

Most federal government organizations have a Federal Advisory Committee (FAC). To designate the rules and regulations of all FACs, Congress passed the Federal Advisory Committee Act (FACA). The FACA notes the terms of service, outlines conflict of interest checks, and mandates the establishment of a committee management office within each federal organization. The intent of the FACA is to allow federal departmental leaders to receive advice so that "no stone is left unturned" in improving their organizations.

THE ARMY SCIENCE BOARD: A GREAT ASSET TO THE ARMY AND THE NATION

MAJ William J. Belknap

The ASB is a FAC organized under the FACA. The ASB advises and makes recommendations to the Secretary of the Army; the Chief of Staff of the Army (CSA); the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASAALT); the Army staff; and other major Army commanders on scientific and technological matters of concern to the Army.

The Secretary of the Army delegates oversight authority to the ASAALT, who serves as the ASB Director. The ASB is internally managed by a small office composed of an Executive Secretary, Executive Officer, and several assistants who interact with the members daily to facilitate study development, organize the summer study report-writing session, and execute study outbriefs.

Membership

The ASB is composed of up to 100 members although current membership is being reduced to 50 to allow more participation by expert consultants. ASB members include distinguished individuals from the private sector, academia, and non-DOD government agencies. Membership on the ASB is by invitation from the Secretary of the Army. Individuals are appointed to serve for up to three renewable 2-year terms.

The Secretary of the Army also appoints the chair and the vice chair from among ASB members. The ASB Chair also serves as an *ex officio* member of the Defense Science Board. ASB membership is augmented by a small number of consultants who are appointed to 1-year terms and who provide specialized input to ASB studies.

Annual Meeting

An annual meeting is generally held in October at an Army Training and Doctrine Command (TRADOC) installation. The 1999 annual meeting was held at Fort Sill, OK, home of the Army's Field Artillery School. The meeting's theme was "Transformation of the Army in the Information Age." Members not only received transformation briefings from Army experts, but also from experts from the Office of the Secretary of Defense and the other Services. The school commandant gave updates on the latest developments in field artillery and provided an artillery live-fire demonstration where selected members had the opportunity to fire a Paladin and a Multiple Launch Rocket System launcher.

Summer Studies

The ASB normally conducts two summer studies that address major Army issues or concerns. Study topics and chairpersons are designated at the annual meeting, and study sponsors and staff assistants are determined shortly thereafter.

The studies are 1 year in length, highlighted by a July report-writing session and outbriefing to Army and DOD leaders, which occurs at the University of California's Beckman Center in Newport Beach, CA.

FY99 Summer Studies

The ASB conducted two overarching studies in FY99: *Enabling Rapid and Decisive Strategic Maneuver for the Army After 2010* and *Full-Spectrum Protection for 2025-Era Ground Platforms.* Both studies focused on how the Army can prepare for the Army beyond 2010.

Terms of reference for the studies were completed and signed by the ASAALT. Former CSA GEN Dennis J. Reimer sponsored the FY99 strategic maneuver study and GEN John N. Abrams, Commanding General, TRADOC, sponsored the full-spectrum protection study.

During the yearlong process toward completing the overarching studies, participants met for 2 days every month. The studies were finalized at a 2-week summer study report writing session/outbrief in July 1999. CSA GEN Eric K. Shinseki was the senior attendee at the outbrief. Other important attendees included representatives from the Defense Advanced Research Projects Agency, the U.S. Transportation Command, and the Joint Chiefs of Staff (JCS).

Sponsoring individuals are either present for the outbrief or are scheduled to receive the outbrief at a later date. Additionally, outbriefs are provided to anyone having an interest in the study recommendations and findings. During the last several months of 1999, the studies were outbriefed to the Secretary of the Army, the Under Secretary of the Army,

The ASB focuses on issues of importance to large segments of the Army, and its "products" are delivered in a candid, timely, and tailored fashion.

the Army Vice Chief of Staff, and Army staff, as well as to the other Services' leadership.

There were also other "customer-driven" special studies conducted in FY99. During the Allied Force Campaign, the ASB quickly assembled and brainstormed weapon-system technology insertions, then outbriefed their study recommendations to the Army leadership and the JCS.

Study Recommendations

The Army acts on study recommendations by appointing a general officer or Senior Executive Service member to develop an Army implementation plan. Specifically, the ASAALT requests the Army Staff Director make the appointment. As one might expect, this does not mean the Army will approve or adopt every recommendation. The Army will, however, formally review all recommendations and act on those considered most important to the Army.

ASB reports are available *for official use only* upon completion of the study. Once the Army Deputy Chief of Staff for Intelligence (DCSINT) and the Army's Public Affairs Office clear the reports, they are also made available to the public.

A listing of past reports is on the ASB's home page at **http://www.sarda.army.mil** (click on

Army Science Board). Additionally, reports can be ordered through the Defense Technical Information Center's (DTIC's) home page at **http://www.dtic.mil**. Classified sections of a report must be cleared through the ASB Office and DCSINT.

Conclusion

The Army can benefit greatly by remaining involved with ASB studies. ASB members and consultants are highly supportive of the Army and have enormous respect for the warfighter. The reward for their efforts and services, which are offered *pro bono*, is to have their views on the challenges facing the Army and the Nation heard by the Secretary of the Army and other key leaders.

In 1999, ASB members volunteered more than 20,000 hours of their time on the two summer studies. In addition, the study chairmen volunteered a large amount of their time conducting more than 50 outbriefs to an audience of 600-plus DOD and industry leaders. The impact of the ASB has been far-reaching.

The future of the ASB is extremely bright. The board will continue to capitalize on past studies and provide the Army independent outside advice on emerging technologies and other relevant challenges that Army leaders have requested that it address.

MAJ WILLIAM J. BELKNAP is the Executive Officer, ASB, HQDA. He received his bachelor's degree from the U.S. Military Academy and his M.B.A. from Wayne State University. Belknap is a graduate of the Army Command and General Staff College and a member of the Army Acquisition Corps.

ACQUISITION CENTRALL:
GETTING THE WORD OUT ON ACQUISITION LESSONS LEARNED

Keith Snider

Introduction

Beginning this summer, the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center-Monterey, CA, (TRAC-Monterey) will launch a project to establish and operate a "virtual" information center for acquisition lessons learned. Sponsored by the Office of the Deputy Director for Acquisition Career Management, Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, the project is called "Acquisition CENTRALL" (Acquisition Center for Research and Lessons Learned). Acquisition CENTRALL will allow acquisition professionals to share knowledge by providing them the capability to collect, analyze, and disseminate lessons learned, best practices, and success stories, as well as relevant findings from acquisition researchers.

Acquisition professionals will have the ability to submit lessons learned that will become the center's "library" of acquisition knowledge using the various features of the Acquisition CENTRALL Web site. Other users will have access to the library through various search features. However, Acquisition CENTRALL will be more than an information repository. It will also serve as a forum to exchange ideas on issues of interest to acquisition professionals. In addition, Acquisition CENTRALL will connect acquisition practice with theory by providing a means for practitioners to make their knowledge needs known to those researchers with the resources to satisfy those needs.

Lessons Learned Systems

The Acquisition CENTRALL initiative is a first step toward equipping the acquisition community with a resource similar to that provided to Army warfighters by the Center for Army Lessons Learned (CALL) at Fort Leavenworth, KS. Established in 1985, CALL's early focus was on studying warfighting lessons learned from units at the National Training Center in Fort Irwin, CA. However, since its establishment, CALL has expanded its mission to include studying lessons learned from actual combat operations (e.g., JUST CAUSE in 1989), as well as those from other combat training centers. CALL's methods include both active collection of lessons learned by dedicated expert

Acquisition practitioners face tough challenges and seemingly intractable problems daily, but they rarely have the resources to study them systematically.

observer teams, as well as passive collection of lessons learned submitted from the field. CALL disseminates lessons learned in a wide variety of media, including newsletters, handbooks, and bulletins, as well as via the Internet.

The definition of lessons learned varies, depending on each organization's perspective. For example, CALL defines a lesson learned as "validated knowledge and experience derived from observations and historical study of military training, exercises, and combat operations." In contrast, the Marine Corps defines lessons learned as "procedures developed to *work around* shortfalls in doctrine, organization, equipment, training and education, and facilities and support." Each organization also has its own structural arrangements for handling lessons learned. The Department of Energy's Environmental Restoration Office has developed an agencywide program with lessons-learned "coordinators" at each of its own sites and each of its contractor facilities. The U.S. Geological Survey has taken a very different approach by generating lessons learned that are based on results of environmental scientific studies.

Acquisition CENTRALL's Features

Acquisition CENTRALL offers unique features which, together, distinguish it from existing resources. First, although it is sponsored and operated by the Army, its focus is DOD-wide. Second, it emphasizes management (e.g., program management, contract management, test and evaluation management, software acquisition management) lessons learned in acquisition rather than more technical (i.e., scientific or engineering) lessons learned in research, design, or development. Third, as mentioned earlier, Acquisition CENTRALL brings research assets to bear in lessons learned.

To elaborate on this last point, Acquisition CENTRALL will allow

Lessons learned have tremendous potential in helping acquisition organizations achieve and maintain high effectiveness during the current period of continual change. However, this potential cannot be realized without the involvement of an organization's individual members.

acquisition professionals to request information from those researchers with the resources to provide it. Acquisition practitioners face tough challenges and seemingly intractable problems daily, but they rarely have the resources to study them systematically. Additionally, they seldom have the resources to study and document significant events in the life of a program or organization. Using Acquisition CENTRALL's capabilities, these practitioners can describe these issues and recommend further study. These descriptions will be available to graduate student researchers and management faculty at the Naval Postgraduate School (NPS), the University of Texas, and other institutions. The results of these researchers' studies will then become part of the Acquisition CENTRALL library for use by the entire acquisition community.

Theory-Practice Connection

The theory-practice connection has been accomplished successfully in the past, as indicated by several excellent master's theses by NPS students. These students sought out program managers and other acquisition professionals to obtain ideas for their thesis research, and the practitioners responded with the types of "real-world" concerns described earlier. As a result, the students' research contain findings that have practical as

well as theoretical significance. For example, one Army student recently examined various modernization through spares initiatives in Army program offices. Another student analyzed risk-management strategies in the Marine Corps' Advanced Amphibious Assault Vehicle Program. Each of these research efforts contains lessons learned that may be of interest to practitioners throughout the Defense acquisition community.

Future issues of *Army AL&T* magazine will include articles summarizing these or similar studies and the lessons learned from them. These articles will provide broader dissemination of study findings and the capabilities of Acquisition CENTRALL. The first article, by NPS Professors COL David F. Matthews (USA, Ret.) and Dr. Mark E. Nissen, follows this introductory article to Acquisition CENTRALL. It provides commentary on key lessons learned from two separate research efforts on software development in the Bradley Fighting Vehicle Systems Program.

Conclusion

Lessons learned have tremendous potential in helping acquisition organizations achieve and maintain high effectiveness during the current period of continual change. However, this potential cannot be realized without the involvement of an organization's individual members. Hopefully, Acquisition CENTRALL will help to achieve this. To learn more about how you can participate in this exciting new project, visit the Acquisition CENTRALL link on the Army Acquisition Corps home page at **http://dacm.sarda.army.mil**.

KEITH SNIDER is on the faculty of the Department of Systems Management, Naval Postgraduate School, Monterey, CA. He has a Ph.D. in public administration from Virginia Tech and is a former member of the Army Acquisition Corps.

SOFTWARE ACQUISITION LESSONS LEARNED THROUGH STUDENT THESIS RESEARCH

COL David F. Matthews (USA, Ret.) and Dr. Mark E. Nissen

Introduction

Software is having a revolutionary impact on modern weapon systems for all military Services. U.S. Army users are demanding revolutionary digital capabilities for ground combat systems that were unthinkable only a generation ago. In fact, at the beginning of the 1990s, combat arms users were demanding the equivalent of track-laying aircraft with fully integrated weapons, "avionics," and inertial navigation systems.

This shift in desired capabilities was a major departure in how the ground materiel development community dealt with mechanical and electrical hardware development and integration. This change also affected key prime Defense contractors. Major ground system project managers (PMs) were suddenly confronted with the challenge of the Army's new digitization initiative, which meant they had to simultaneously develop upgraded, digitized versions of current systems and create PM/contractor software management and development capabilities. This was a daunting challenge.

The DOD research and development community recognized that software development and integration had become the most difficult challenge facing a PM. Software quickly became the highest risk factor on most major weapon system programs. Despite numerous policies, directives, metrics, and military specifications and standards to assist program executive officers and PMs in managing embedded software development, problems persisted. Surprisingly, the greatest difficulties with software-intensive programs were not from technical problems. Rather, study after study (e.g., Defense Science Board, General Accounting Office, and commercial practices) concluded that principal problems with software-intensive programs were a result of poor management.

Because of these findings, DOD increased emphasis on software management training. During 1992, the Naval Postgraduate School (NPS) in Monterey, CA, added an embedded software management course to its Army-sponsored Systems Acquisition Management Master's Degree Program and encouraged students to pursue software-related topics in their thesis research. This article discusses two of these student theses, published in 1996 and 1998, and the lessons learned from the author's research on system software management.

Embedded Software Thesis

The close proximity of NPS to Silicon Valley and the Bradley Fighting Vehicle System's (BFVS) prime contractor (United Defense Limited Partnership (UDLP)) provided a unique opportunity for "hands-on" student research. The first thesis to capitalize on this opportunity and the cooperative relationship between NPS and the BFVS Program Office is *Embedded Software Development: A Case Analysis of the U.S. Army Bradley Fighting Vehicle A3 Program*. In his thesis research, NPS student MAJ Kenneth P. Rodgers, with the full support of PM, BFVS and UDLP, began a case analysis of ongoing embedded software development for the digitized Bradley A3 Upgrade Program. Beginning in 1995, Rodgers was granted free access to all program documentation and permitted to attend all software-related meetings and program reviews at UDLP's facility.

Chapter II of his 137-page thesis presents a summary of DOD software challenges, policy, and development processes; discusses the relationship between systems engineering and software engineering; and highlights the growing use of object-oriented software development. Chapter III outlines the A3 Upgrade Program and emphasizes acquisition planning and the software development plan. Chapter IV, discussed below, presents issue analysis and lessons learned.

Rodgers' analyses and lessons learned are approached from the PM's perspective and focus on major management-level issues impacting software development. The PM, BFVS quickly realized the revolutionary challenge he faced and knew that neither the project management office (PMO) nor UDLP personnel had the organic software management expertise to meet that challenge. However, the PM knew of the expertise within the former Missile Command's Software Engineering Directorate (SED) and requested their assistance. SED's role quickly evolved to one of consultant and "mentor" to both UDLP and the PMO. Additionally, SED placed personnel permanently onsite at UDLP and devised a software management "short course" that was presented to both PMO and UDLP personnel.

The lessons learned from this analysis indicated that from a program's inception, a PMO/prime contractor software capability self-assessment is essential to determine what additional outside resources will be necessary to ensure success. Additionally, experience represents a critical factor on any software-intensive system. The PMO, prime contractor, and all subcontractors working with software must have experience. If such experience cannot be obtained within a PMO, assistance should be sought elsewhere. Unless a contractor has direct experience with software similar to the systems and functionality contemplated, the corresponding risk will be large. This was the case with the BFVS.

Developmental Approach

Another result of the experience issue noted above was the software developmental approach. The prime contractor started with a traditional "waterfall" approach, but ambiguous and still-evolving user requirements in the new digital world engendered such a high-schedule risk it forced a change to an "incremental" approach. This change in approach is common with software-intensive systems. Indeed, best practices call for such incremental and evolutionary development unless a compelling argument can be made otherwise. It is very difficult to capture and hold firm requirements for a system that involves software. A user's mere exposure to prototype versions of new software-enabled weapon systems seems to spark additional requirements. This is the rationale behind modern practices such as rapid prototyping and heavy, upfront, and continuous user involvement with software development.

Related to this waterfall-development problem was the system-level software integration challenge that constituted the "critical path" to reduce schedule risk. Rodgers' research revealed the systems engineering process had not produced interface-planning documents to ensure UDLP subcontractors understood the various software interfaces. Thus, the integration schedule was at risk. The lesson learned: from Day 1, the PM and prime contractor must place special management emphasis on integration planning and interface control development as the "keystones" to eventual program success. Again, this problem derives in large part from the experience issue noted earlier.

Several of Rodgers' issues are summarized in a lesson learned that he calls *The Systems/Software Team*. He writes, "Systems and software engineers must be teamed together and communicate continuously throughout the development process. Software engineers must be involved in the systems-level analysis, requirements generation, and requirements allocation (to software). Likewise, systems engineers must be involved in the software engineering process to [ensure] that the software requirements and software designs satisfy system requirements."

While this lesson learned might appear obvious, in practice it is very difficult to implement, particularly in PMOs and prime contractor facilities undergoing the digital revolution. It is even more difficult for contractors who are expected to learn about

software development concurrently with the development itself.

Software Metrics Thesis

The second student thesis on system software is *Software Metrics: A Case Analysis of the U.S. Army Bradley Fighting Vehicle A3 Program*. In this thesis research, NPS student CPT James Romero, with the full support of PM, BFVS and UDLP, continued an analysis of the ongoing embedded software development for the digitized Bradley A3 Upgrade Program. This thesis provides BFVS background information in Chapter II. In Chapter III, the thesis presents a useful summary of software metrics that are used specifically to investigate metrics use on the Bradley Program. Perhaps most germane to this article, in Chapter IV, Romero presents results of his Bradley-metrics analysis and discusses the following seven important lessons learned:

- Hire experts;
- Focus metrics on program management;
- Implement only the most useful metrics;
- Make the software developer responsible for metrics;
- Tailor the metrics (e.g., management level, program stage, presentation);
- Get educated on software development and metrics; and
- Foster cooperative relationships for success.

Several of these metrics-oriented lessons learned (Lessons 1, 6, and 7) correspond directly with those noted in the first thesis. Commenting on Lesson 2, Romero writes, " ... metrics will not be effective if they are collected simply to meet a requirement or to appease an agency external to the program." Indeed, as with hardware-intensive programs, the key to metrics is to capture and analyze data that provide managerial insight into technical progress and problems as well as measure cost and schedule progress against plan.

Lesson 3 appears to represent common sense on first blush, but capturing metrics can be expensive—both in terms of money and managerial time—so only that subset of metrics that proves useful for managing the program should be collected. It is important to understand that this set of metrics may not be apparent at program outset and may change during the life of a program.

The point of Lesson 4 is that metrics collection and analysis should be integral to

a contractor's software-development process, not merely an adjunct effort required by contract. Metrics collection and analysis represents a key part of a mature software-development process, and assessments such as those corresponding to the Software Engineering Institute's Capability Maturity Model can provide a good reference point for a contractor's capability.

Finally, Lesson 5 conforms to two pieces of advice that instructors give for managing software-intensive programs: details matter a great deal, and one size fits no one well. Software is developed through a process, and the same software developed through two different processes may share nothing in common technically, yet produce identical output and performance. Metrics must be compatible with, and provide insight into, the software development process. Because every contractor's process is somewhat unique, it is unrealistic to expect a single set of metrics to be universally applicable and informative.

Conclusion

To summarize, software is powerful technology that lies at the center of military digitization and represents a critical, high-risk element in nearly every major weapon system development. Experience is very important in software development, as is the integration of software engineering with systems engineering. Additionally, metrics provide an indispensable window into technical progress and problems, which is particularly important when program performance is dependent on an abstract, invisible, complex technology such as software.

COL DAVID F. MATTHEWS (USA, Ret.) teaches acquisition courses in the Department of Systems Management, Naval Postgraduate School, Monterey, CA. He is a former Program Manager of the Army Tactical Missile Systems Program.

DR. MARK E. NISSEN teaches software management and information technology courses at the Naval Postgraduate School. He received his Ph.D. degree from the University of Southern California and has published extensively in the areas of acquisition, knowledge management, and re-engineering.

New Initiatives For The New Millennium . . .

ARMY ACQUISITION CAREER MANAGEMENT WORKSHOP 2000

Sandra R. Marks

What skills will future members of the Army Acquisition Workforce (AAW) require? How will the Acquisition Career Development Plan (ACDP) assist the future workforce? What role will the acquisition community play in the Army Chief of Staff's (CSA's) vision? These were some of the key issues explored when more than 140 members of the AAW and the Army acquisition leadership met in New Orleans, LA, Jan. 18-21, 2000, for the fourth annual Army Acquisition Career Management Workshop.

Prior to the start of the formal workshop, Keith Charles, then Deputy Assistant Secretary of the Army for Plans, Programs and Policy and Deputy Director for Acquisition Career Management, Office of the Assistant Secretary of the

Army for Acquisition, Logistics and Technology, and Mary Thomas, Deputy Director of the Army's Acquisition Career Management Office (ACMO), met with Acquisition Career Management Advocates (ACMAs) to review current initiatives. Concurrently, Trish Hopson, ACMO Proponency Officer, led a training session for certifying officials and acquisition career managers. The purpose was to review the new, more centralized certification process and refine certifying officials' guidelines. Under the new process, individuals will be certified by Level III certified individuals appointed by the Functional Chiefs, or their representatives, to certify at Levels I, II, or III in their own career fields. In addition, acquisition career managers will be the focal point for facilitating and regulating the

process. Certification requests will go through them and be forwarded to certification officials for processing. Thus, individuals will work with their acquisition career manager on a consistent basis for all career management issues.

Opening Session

Charles opened the formal workshop by recognizing Acquisition Workforce Support Specialist (AWSS) of the Year Polly Merlo and ACMA of the Year Toni Gaines. Merlo is a National Capital Region AWSS at Aberdeen Proving Ground, MD, and Gaines is an ACMA in the Southern Region employed at U.S. Army Forces Command in the Office of the Principal Assistant Responsible for Contracting.

AWSS of the Year Polly Merlo

ACMA of the Year Toni Gaines

In his presentation, Charles outlined the CSA's vision and referred to the current period as "revolutionary times" for the Army and its acquisition community. He said the vision to transform the force, recent workforce reductions, and aging workforce issues will place substantial demands on the acquisition community and its leaders, requiring huge changes in the way the AAW conducts business. The challenge, he said, is to change the culture of the AAW.

Mary Thomas expanded on Charles' appeal to accommodate change in the future. Leadership, Thomas said, is the key because organizations must have effective leaders to adapt to change. She added that preparing innovative leaders with multifunctional experience is now more critical than ever. Thomas used the ACDP to illustrate the components necessary for developing successful leaders. The ACDP, she remarked, further provides the framework for developing a career progression map. (The ACDP was the subject of a workshop that is discussed later in this article.)

IPT Outbriefs

In the fall of 1999, a process action team composed of key personnel from the ACMO, the U.S. Total Army Personnel Command (PERSCOM), and the Army Acquisition Executive Support Agency (AAESA) began outlining the plan for integrating the functions of these three organizations. As a result of this meeting, a series of integrated process teams (IPTs) was formed to address high-priority issues, align new processes, and align responsibilities within those processes in accordance with the missions of the three organizations.

A briefing session was held during Workshop 2000 to present progress reports from the IPTs. Each presentation is highlighted below.

Career Paths/Career Development. The objective of this IPT was to provide recommendations on how to apply the framework of the ACDP and determine roles of the players. An initiative was established to build a framework of acquisition career managers providing "one-stop service" to every element of the AAW.

Army Acquisition Corps (AAC)
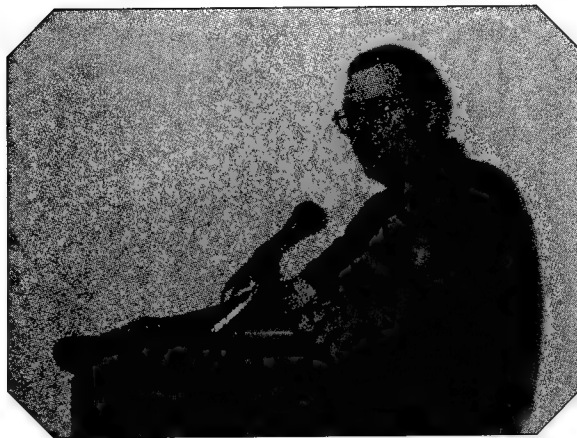
COL Roger Carter

Membership. This IPT used an organizational approach to explore the establishment of procedures for civilian AAC membership. The team concluded that more guidance is needed in the field in addition to better customer service for AAC members. One of the initiatives they called for is distribution of a welcome packet by acquisition career managers. The packet would contain a welcoming letter, a point-of-contact pamphlet, and a playbook.

Certification Process. This IPT reviewed the new process, "Army Acquisition Career Field Certification Policy," dated Sept. 30, 1999, for purposes of refining the procedures, drafting certifying officials' guidelines, and developing a timeline for putting the new process in place. As a result of their efforts, the IPT refined the procedure to designate acquisition career managers as the focal point for facilitating and regulating the process. (See related paragraph on the pre-Workshop 2000 session on the new certification process earlier in this article.)

Selection Boards. This IPT was tasked to identify current AAC selection boards, review the selection board processes, standardize the board process, identify responsible agencies for each function, develop a transition plan, and finalize a procedures document for conducting an AAC selection board. Some of the suggestions the IPT made are to encourage AAC members to serve as board members, develop a database to track board service, and consolidate boards where possible.

The Army Tuition Assistance Program (ATAP). ATAP provides civilians 100-percent tuition reimbursement. The IPT reported that administration of this program is being transitioned to acquisition career managers. This change is expected to make it easier for individuals to apply. Acquisition career managers will review and process ATAP files while the ACMO will draft and maintain policy.

Position Management. This IPT was chartered to improve the effectiveness and efficiency of position management processes to support acquisition career development and career management. One of the key initiatives they reviewed was to improve position definitions after position requirements are defined. Using a common format, a template-based description, and common language to describe a position will enable a better match of individual skills with position requirements. Position management, the team concluded, is the keystone process for enabling all the other career development activities.

There was an additional update on the status of Corps Eligible (CE) members. The CE initiative allows the AAC to see who may be qualified for future critical acquisition positions. The CE administrative process is being transitioned to acquisition career managers who will now review and process CE applications and maintain acquisition career management files. The ACMO, however, will retain program oversight.

Following the IPT briefings, COL Roger Carter, Director, ACMO, reflected on the initiative to focus on acquisition career managers. He stressed that the goal is to empower acquisition career managers as the "one-stop shop" for all AAW members.

Workshops

One objective of Workshop 2000 was to present information and receive feedback on current AAC initiatives prior to their implementation. This objective was achieved via four separate interactive workshops. Highlights from each workshop follow.

The Acquisition Career Development Plan: A Framework For Success. The ACDP was developed to help create a career progression map that guides AAW members from a functional expertise level to a leadership competency level required for key leadership positions. The ACDP provides AAW members with the tools

necessary to achieve success at all levels. The ACDP objective is to provide a method for focusing on the skills, knowledge, and characteristics needed to be competitive.

The ACDP is composed of four integrated processes: Structure/Position Management, Development Model, Career Management, and Competency Model. The Structure/Position Management process ensures that acquisition position requirements meet the overall acquisition mission while simultaneously meeting the career development needs of the individual.

The Development Model is used to develop the ability to achieve career progression while meeting the needs of the AAW. First, functional expertise is achieved by completing required education, training, and experience needed for certification. This is accomplished through such initiatives as Defense Acquisition University training and use of the ATAP. Second, experience is broadened through additional education, training, and experience opportunities that build cross-functional and leadership competencies. Participation in the Competitive Development Group (CDG) Program, rotational and development assignments, and operational experience are examples of broadening opportunities. Finally, strategic leadership is applying acquired leadership skills and multifunctional knowledge to key leadership positions. The process provides the best fit of individual competencies to specific organization and position needs.

Career management is the iterative process that allows acquisition professionals to take control of their career development. Career management goals are to enhance organizational effectiveness and upgrade the general quality level of employees. This is accomplished first by providing education, training, and experience opportunities and by making the best possible match between an AAW member and an acquisition position.

The career management process consists of three steps: defining career goals and objectives, individually assessing one's strengths and weaknesses in terms of both functional and leadership competencies, and developing career record briefs such as individual development plans (IDPs). This process communicates a person's achievements, tells what a person can offer an organization, and what

Bruce Waldschmidt addresses a working lunch.

components a person brings to a job.

Acquisition career managers are key players in the career management process. They facilitate the career management process and serve as an objective source for assistance. (Acquisition career managers are the subject of a workshop discussed later in this article.)

The Competency Model ensures the acquisition community communicates in a consistent manner across all acquisition career fields and organizations. The model uses 27 leadership competencies developed by the Office of Personnel Management in addition to acquisition career field functional competencies necessary for success in acquisition positions. Leadership competencies coupled with functional competencies comprise the common language of the ACDP.

Portions of the ACDP are being piloted this year to ensure it is comprehensive and responsive to the needs of the total workforce and the acquisition mission.

Performance Evaluations—A Study of CCAS and TAPES. This was a comparative analysis of the major components of the Total Army Personnel Evaluation System (TAPES) and the Contribution-based Compensation and Appraisal System (CCAS). The purpose of this workshop was to acquaint conferees with CCAS, the evaluation system for the DOD Civilian Acquisition Workforce

Personnel Demonstration Project. This demo includes the Army, Navy, Marine Corps, and Air Force. The Army currently has 15 commands and program executive offices participating with nearly 1,500 employees under CCAS.

Selection of Best Qualified—An Insider's View. Best Qualified Selection Boards are held annually for best qualified LTC/GS-14 acquisition command and product manager positions, COL/GS-15 acquisition command project manager positions, and the CDG Program. This workshop included a step-by-step overview of the PM/Acquisition Board process from both the military and civilian perspectives. The first half of the workshop focused on aspects of preparing for the board, such as eligibility requirements. The second half of the workshop focused on the board itself, including membership criteria and the slating process.

Acquisition Career Managers—Who Are They and What Do They Do? An overview of the roles and responsibilities of acquisition career managers was provided in this workshop. Each AAW and AAC member has an acquisition career manager. Thus, it was appropriate that this workshop began by identifying acquisition career managers for each element of the acquisition community. Civilian members of the AAC and CDG members are served by acquisition career managers at PERSCOM who maintain updates, correspondence, and performance/potential evaluations. Regionally located acquisition career managers assist all other civilian AAW members including CE members. They maintain acquisition career record briefs (ACRBs), performance/potential evaluations, and correspondence. Each officer has a military assignment officer in the Acquisition Management Branch at PERSCOM. They ensure that career management files are updated, conduct field interviews, and maintain correspondence. Army National Guard and Reserve officers have their own acquisition career managers.

The acquisition career manager uses the acquisition position list (listing current availabilities by region, career field, and grade structure), the ACDP, and knowledge of the acquisition environment (trends, board results, promotion rates) to assist individuals. While it is the individual's responsibility to maintain an IDP, the acquisition career manager assists in

developing and executing the plan by assessing objectives and providing guidance. Acquisition career managers also maintain performance appraisals (civilian), officer evaluation reports (military), Senior Rater Potential Evaluations (civilian), and Senior Rater Profile Reports.

Working Lunches

Two working lunches were held during the workshop to further examine topics relevant to the acquisition community. During the first working lunch, Bruce Waldschmidt, Director of Acquisition Policy, Office of the Deputy Assistant Secretary of the Army for Plans, Programs, and Policy, presented "Policy Update: Where We're Going With 5000." He provided an overview of the accelerated effort directed by Dr. Jacques S. Gansler, Under Secretary of Defense for Acquisition, Technology and Logistics, to rewrite DOD 5000-series documents. According to Waldschmidt, major objectives of the 5000 series include development of a new acquisition model that reduces cost and cycle time while improving performance, movement of DOD to a commercial-style acquisition approach, implementation of Section 912 recommendations; and further streamlining of the acquisition process. Many of these changes will be reflected in DoD Directive 5000.1, *Defense Acquisition*; DoD Regulation 5000.2-R, *Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information Systems*; and other directives and regulations.

LTC Scott Lambert, the speaker at the second luncheon and ACMO Chief of Information Management, presented "An

Enterprise Approach To Career Development." Lambert provided an overview of the AAC's information architecture strategy and how it will benefit individual career development decision-making.

Additional Sessions

The final day culminated with a panel discussion featuring Keith Charles; David Snyder, Deputy Assistant Secretary of the Army for Civilian Personnel, Office of the Assistant Secretary of the Army for Manpower and Reserve Affairs; and Melinda Darby, Deputy Chief of Staff for Personnel, U.S. Army Materiel Command. Serving as moderator, COL Carter introduced panel members, noting that the panel discussion offered a "rich opportunity" to query three key players in the policy and personnel arenas about the impact of new civilian personnel policies on the acquisition community. Topics that drew great interest from conferees included current initiatives to deal with the aging workforce, the current classification system, regionalization, intern programs, Resumix, and the impact of the CSA's vision on the workforce.

Summary

Workshop 2000 gave us a greater understanding of where the CSA wants to take the Army relative to the Acquisition Workforce, Charles said in closing remarks. By understanding "the endgame," we can now recognize the huge challenge ahead, he added. Charles called on ACMAs to make sure that supervisors they represent use resources such as ACRBs and IDPs to improve workforce data. The quality of this data,
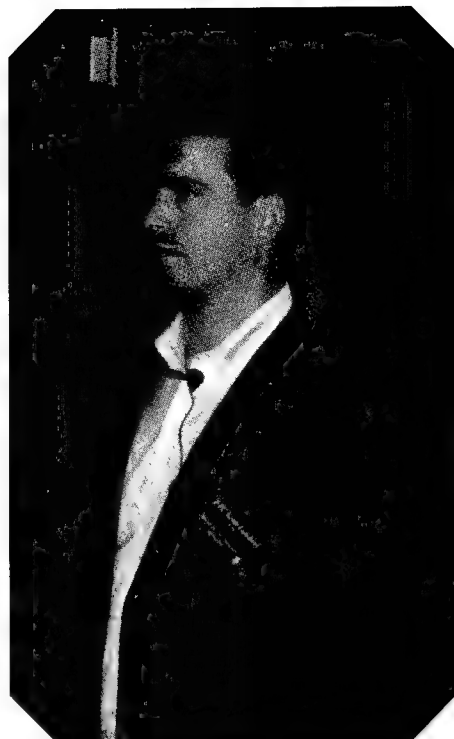
LTC Scott Lambert addresses a working lunch.

Charles emphasized, will determine the quality of service provided by HQDA to acquisition career managers. Quality data will allow us to deal with issues proactively rather than reactively by targeting particular situations and geographic regions. Finally, Charles said, the roles of the ACMO, AAESA, and PERSCOM need to be clearly understood. The ACMO deals with strategic, policy-level issues such as the aging workforce and midgrade positions. AAESA is responsible for resource issues and the Total Army Analysis process. PERSCOM, via its acquisition career managers located at PERSCOM HQ and other regional locations, works on people issues.

The first acquisition workshop of the new millennium proved an excellent vehicle for sharing ideas on what the future holds for acquisition management.

Panel discussion members Melinda Darby, Keith Charles, and David Snyder

SANDRA R. MARKS, an employee of Science Applications International Corp. (SAIC), provides contract support to the Army AL&T magazine staff. She has a B.S. in journalism from the University of Maryland, College Park, MD.

ENGINEER AND TOPOGRAPHIC ISSUES OF THE FULL-SPECTRUM FORCE

Dr. Lewis E. Link Jr. and
COL Gregory G. Bean

Full-Spectrum Operations

Army engineer capabilities and expertise are key enablers of full-spectrum operations. These capabilities require increased heavy-force deployability and light-force lethality. Engineers must project, protect, and sustain the force in theater and support maneuver operations. Common to these capabilities are modeling and simulation (M&S), availability of mission-specific terrain data, and access to engineering expertise.

The success of the initial brigade and the full-spectrum force depends on a careful balance of capabilities. This includes using knowledge of the terrain to increase survivability and lethality and a dramatically reduced infrastructure that exploits *in situ* resources. These concepts are described below and emphasize engineer research and development efforts in support of the Army vision.

Projecting The Force

Joint Rapid Airfield Construction. Engineer capabilities are important to contingency operations, starting with embarkation infrastructure readiness and ending with placing the force in theater. The primary capability gap is at the theater end. Strategic deployment by C-17 aircraft requires engineering expertise to determine the capability of existing airfields and expeditious means to augment and maintain those facilities. Intratheater deployment by C-130 aircraft requires rapid upgrading of existing airfields or the construction of new ones. These requirements, combined with the need for reduced logistics footprints, mandate significant enhancements in engineer equipment productivity, surface stabilization, and indigenous materials usage.

Contingency field selection can be improved via enhanced site-selection methods. Critical factors are connectivity to Lines of Communication (LOCs) and minimizing the effort to augment or construct a field. These needs are directly addressed by rapid mapping and image exploitation technologies emerging from the Army tech base program. Equipment productivity can be enhanced through coupling Global Positioning System (GPS) and laser-leveling technologies with the new Deployable Engineer Universal Combat Earthmover (DEUCE) and current inventory graders. GPS technology, adapted for the DEUCE through a cooperative effort between the Army and Caterpillar Inc., can potentially reduce construction time by one-third, as demonstrated in civilian construction tests. For example, construction of a basic landing field could be reduced from 15 to 10 days. Landing surface stabilization using soil, cement, or lime requires up to 28 days for setup. However, new agricultural-based compounds have shown the potential to provide similar strengths within 24 hours. A technology demonstration program has been designed to integrate and demonstrate these capabilities. These new approaches are also being studied to achieve the strengths needed for C-17 aircraft.

Joint Logistics Over the Shore. Most of the materials for a deployment will likely arrive by ship, providing the challenge of offloading (lightering) the materials to the onshore location. However, if port facilities are denied or inadequate, logistics over-the-shore operations will be necessary. Lightering cannot occur if the average wave height is above 3 feet or Sea State 3, a condition prevalent in most areas of the world.

A Rapidly Installed Breakwater System (RIBS) (photo on Page 30) provides significant protection from waves for lightering, increasing throughput by 20 to 180 percent. An Army advanced technology demonstration of the breakwater system is tied to companion developments by the Navy. A second challenge is to get materials across the beach. This requires expedient stabilization methods to enhance the trafficability of beach soils. Adding small volumes of fibers to sand dramatically improves cross-beach mobility. Finally, use of RIBS technology near shore is also being considered to protect offloading on the beach and to ensure the continuous flow of materials from lighter to LOCs.

Protecting The Force

Bare Base Security. Base camps are a common component in contingency operations. Options include Force Provider (tent-based), southeast Asia (SEA) huts

An ocean view of RIBS
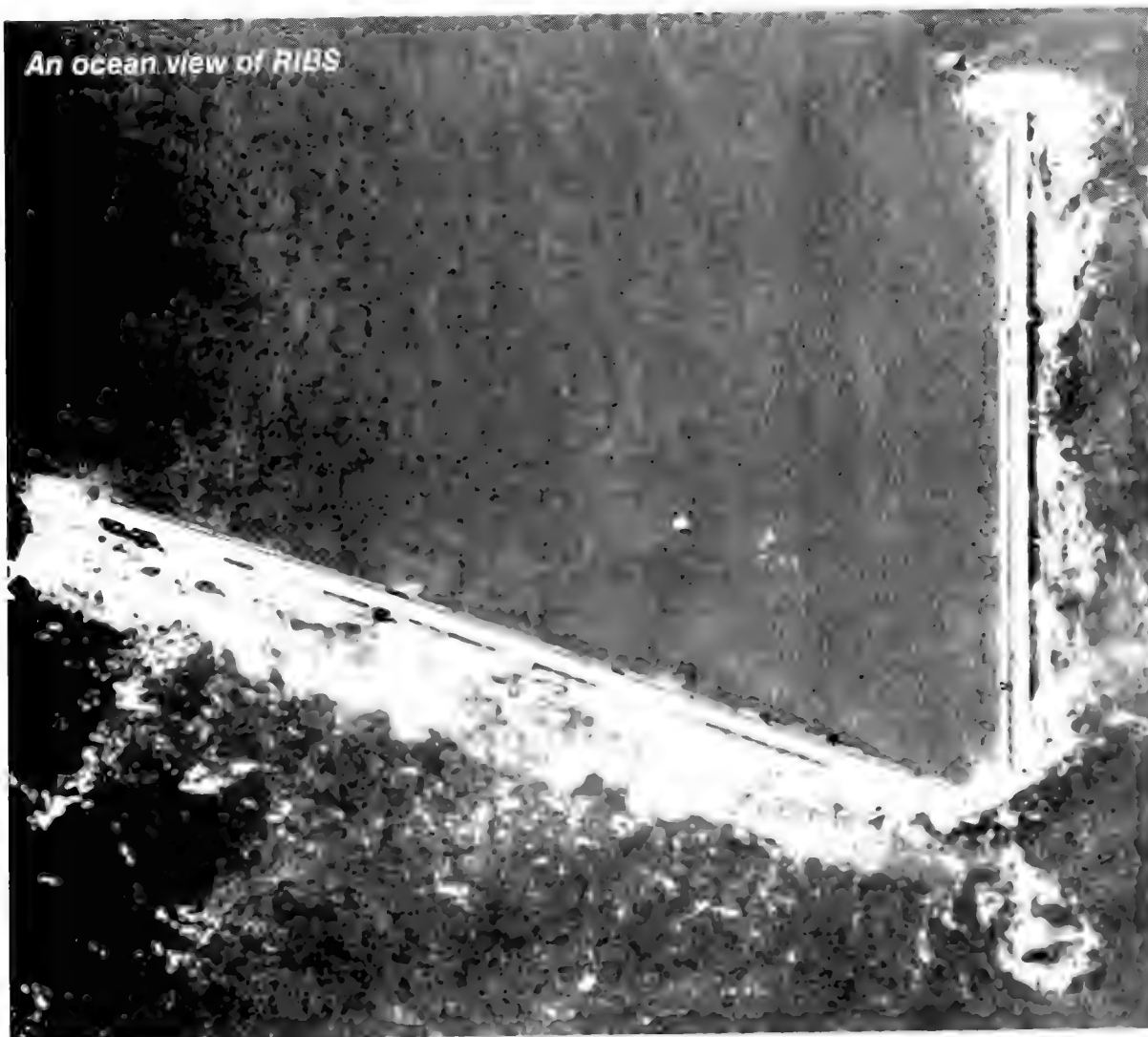
(plywood and frame construction) currently used in the Balkans, and rented or leased structures. Camp security is also a critical element of force protection and must be integrated into the camps. The U.S. Army Corps of Engineers (COE) has developed the Anti-Terrorist (AT) Planner software package, a PC-based program that allows analysis of mitigation options for specific structures and threat scenarios. AT Planner is a part of the joint Vulnerability Assessment Tool being developed by the COE Technical Support Working Group. AT Planner does not assess chemical or biological threats and needs upgrades to integrate alternative measures such as concealment, deception, and perimeter surveillance. This endeavor is of great interest to the engineer, chemical, and military police communities.

Sustaining The Force

Reducing Logistics Footprint. Base camps require a major investment in time, effort, and materials. Building two SEA hut camps in Kosovo required 4 months; enough gravel to build a highway from St. Louis, MO, to Kansas City, MO; 192 tons of nails; 86,000 sheets of plywood; and 15,000 sheets of corrugated metal roofing. The Army must reduce this logistics burden while enhancing protection for the soldiers in the camps. Applied research programs exploiting new commercial materials reveal a potential 20-percent reduction in materials usage.

Initiatives for blast, conventional, chemical, and biological weapons protection are also required to significantly reduce the logistics burden.

LOC Infrastructure Assessment and Augmentation. Another concern is the assessment and maintenance of LOCs: roads, bridges, tunnels, and river crossings. The legacy force infrastructure assessment is focused on Class 30 to Class 70 vehicles. The interim-weight force changes that from Class 10 to Class 30. Structures unacceptable for the legacy force will be in the center of the performance window. New tactics, techniques, and procedures (TTPs) for LOC assessment and maintenance processes will have to be considered.

Effective use of indigenous materials can dramatically reduce logistics requirements. In addition, by augmenting existing materials, the volume of transported materials and associated equipment can be reduced. On extremely soft soils, geotextiles and geogrid materials reduce gravel volumes by 50 percent. The goal is to augment local soils and eliminate the requirement for high-quality gravel. Bridge repair and upgrade techniques are also material- and time-intensive. Rapid assessment procedures are needed to accurately determine the capacity of structures and to optimize repairs or upgrades.

Tele-Support. Much of the expertise needed for sustainment engineering is not onsite with the combat force. To make this expertise available and to reduce the logistics footprint of engineer support, a new capability, "tele-engineering," was developed. Tele-engineering evolved from supporting bridging operations on the Sava River in Croatia. It now includes infrastructure assessment, force protection, base camp siting, and construction support. Tele-engineering was tested in exercises in Europe and Korea and provides direct support to Army operations in the Balkans. An integrated concept team was assembled to evolve tele-engineering into a broader tele-support concept and to develop TTPs for use by chemical corps and military police forces.

Maneuver Support

Mobility Modeling. The introduction of a new, smaller, and highly mobile system (e.g., a central control vehicle with robotic satellites) could result in new mobility issues. Whether tracked or wheeled, a smaller vehicle would probably entail performance trade-offs (on- and off-road) and require a new design and modeling base. This new realm of micromobility significantly challenges current modeling and analysis capabilities.

Current mobility models (e.g., NATO Reference Mobility Model) are physics-based and consider the vehicle, terrain, weather impacts on terrain, and driver capabilities. These models typically predict maximum performance, such as the highest average speed a vehicle could

attain on a specific type of terrain. They do not consider tactics and doctrine, performance of small robotic vehicles, or innovative modifications such as dynamic vehicle suspensions.

Modeling and Simulation. Engineer functions are poorly represented in the current and emerging simulation codes. However, a dedicated effort has been initiated to add engineer functional realism to the OneSAF, Warfighter Simulation, Joint Warfare System, and Joint Modeling and Simulation System Programs. This will provide the high-fidelity representation of mobility, countermobility, survivability, and sustainment to support the acquisition, training, and planning processes.

Decision Support. These same functional capabilities are needed for command and control. This is provided through an engineer module to the Maneuver Control System that will be incorporated in the near future.

Terrain Data

Foundation Data. DOD's strategy is embodied in the National Imagery and Mapping Agency foundation data and Mission Specific Data Set (MSDS) concepts. Foundation data support planning and initial operations and serve as the basic source for information. The MSDS densifies foundation data and is tailored to meet mission requirements with timely responsiveness. Major issues for the Army include accommodating the command, control, communications, computers, and intelligence (C4I) infrastructure; M&S; and all echelons of users. Army user communities are evaluating prototype foundation data. Foundation data will not support all M&S efforts or decision-aid applications. The next step involves defining the necessary MSDS for each major application and fostering a means for maximum reuse for both C4I and M&S.

Common Environment Database. Dynamic, interoperable terrain databases are critical to the full-spectrum force. A program goal is to generate information that provides a common view of the terrain and facilitates reuse. This will effectively extend the synthetic theater of war

technology and address terrain conditions, from open and rolling to complex urban, as well as the impact of weather on battlespace conditions. This effort is closely tied to the Army Modeling and Simulation Office's initial production test on the interface of simulation to C4I.

Conclusion

Army engineers are an essential component of the full-spectrum force and require the latest technologies to effectively support future contingency operations. As such, these technologies are critical to ensure the Army can meet its peacetime and warfighting obligations well into the future. A balanced investment strategy includes getting the force to battle, sustaining its operations, and protecting it from conventional and asymmetric threats.

DR. LEWIS E. LINK JR. is the Deputy Chief of Staff for Research and Development, U.S. Army Corps of Engineers. He holds a B.S. in geological engineering from North Carolina State University, an M.S. in civil engineering from Mississippi State University, and a Ph.D. in civil engineering from Pennsylvania State University.

COL GREGORY G. BEAN is the Deputy Director of the Maneuver Support Battle Lab, Fort Leonard Wood, MO. He graduated from the U.S. Military Academy and holds an M.S. in civil engineering from Georgia Institute of Technology. He is also a graduate of the Army War College and is a professional engineer in the Commonwealth of Virginia.

ARMY LEADERS DISCUSS 21ST CENTURY TECHNOLOGY NEEDS

Mike Cast

Program executive officers, program managers (PMs), deputies for systems acquisition, and key Army acquisition leaders met earlier this year at the Army Developmental Test Command (DTC) Headquarters at Aberdeen Proving Ground, MD, to discuss the future of the Army's acquisition test and evaluation program. The 2-day workshop was sponsored by the Army Materiel Command and the Assistant Secretary of the Army for Acquisition, Logistics and Technology. It focused on the technology challenges the Army faces as it transforms from a Cold War force into one that is more rapidly deployable and able to meet the evolving mission demands of the 21st century. Workshop hosts were Headquarters, DTC; the Soldier and Biological Chemical Command (SBCCOM); and the PM, Chemical Demilitarization.

Following welcoming remarks, DTC Commander BG Dean Ertwine introduced MG John Doesburg, Commander of SBCCOM, who manages Aberdeen base operations. Doesburg provided an overview of SBCCOM programs involving research, development, and testing of Army state-of-the-art protective systems and equipment for soldiers.

Assistant Secretary of the Army for Acquisition, Logistics and Technology Paul J. Hoeper followed with an address on some of the Army's future challenges. He said the Army is facing a formidable task in achieving the technical capability to rapidly deploy to troubled areas worldwide and operate across the full spectrum of missions.

Hoeper said the Army must focus on developing weapons, equipment, and organizations that meet the Army vision outlined by Army Chief of Staff GEN Eric K. Shinseki. This transformation of the Army must make the Army more lethal, versatile, agile, survivable, and able to deploy a brigade to any theater of operations within 96 hours, noted Hoeper. Many of the heavy weapons and vehicles still in use since the Cold War hamper mobility, he added, in part because of the weight limitations of aircraft used to transport units and equipment.

LTG Paul J. Kern, Hoeper's Military Deputy, voiced the same concerns as Hoeper. He stressed the need to get the right resources for soldiers of the 21st century and to move beyond the industrial-age culture of the past century.

"The way we test and evaluate is changing with the threat out there in the world," said Brian Barr, Technical Director of the Army Test and Evaluation Command (ATEC). Formed in October 1999, ATEC oversees testing and evaluation performed by its subordinate commands, DTC, the Operational Test Command, and the Army Evaluation Center.

Barr said his command strives to help the Army produce systems that will support mobile, small-scale contingency operations. He said that the testing environment has become extremely complex, adding that "the systems we are being asked to test today are more complex than those we were being asked to test 10 years ago."

One example is the Force XXI Battle Command Brigade and Below (FBCB2). The goal of those involved with the FBCB2 effort is to field a digital command and control system that provides battle command and situational awareness from the brigade down to the soldier or vehicle level. The program is designed to interconnect platforms, or vehicles, through a communications structure known as the Tactical Internet. Army experts see this as a big step forward in battlefield command, control, communications, and intelligence.

Barr also said that the Army is gearing up to test and evaluate new equipment for use by Brigade Combat Teams. The Army will have a short timeframe for testing some of these items, making it extremely difficult to stay on schedule without some around-the-clock testing, he said. "It may be an arduous undertaking for the testers," he said, "but [the Army's efforts] will not be minor to a soldier who is getting shot at."

Walter Hollis, Deputy Under Secretary of the Army for Operations Research, gave a Pentagon perspective on the acquisition test and evaluation process. He referred to the challenge of sending soldiers to places where they can test equipment in an era of drawdown and soldier shortages.

Hollis noted that the Army is increasingly using simulation during some phases of systems and equipment testing. In particular, he gave high marks to the simulators used in missile testing. The Army still needs to develop better simulation to test tanks and other weapon systems, he added.

"Using simulators for missile systems has paid off because we can cut down on the number of missiles fired before moving into production. We don't use simulators as much as we should in other programs because we don't have a lot of them that represent the systems," he explained.

The DTC, which manages proving grounds and operates test centers in several states, is planning and conducting tests and simulations across a full spectrum of environments, said Ertwine during his briefing to workshop attendees. DTC facilities have the capability to conduct tests in various types of environments, including arctic, tropic, desert, shock, vibration, electromagnetic, nuclear, underwater, and live fire. The command also procures new test technology and verifies the safety of new equipment and materiel. Ertwine called safety verification one of the key DTC responsibilities.

DTC also focuses much of its attention on the Virtual Proving Ground initiative, which incorporates advanced simulation and modeling (M&S) to test weapon systems and materials under various scenarios. M&S will never replace actual testing, Ertwine said, but it can focus testing and reduce the number of different tests that some systems undergo, saving significant sums of money.

"We're making huge investments today to be better prepared to test items 10 years from now. We have a big investment in across-the-board test capabilities," Ertwine concluded. Workshop attendees viewed some of these capabilities when they toured the DTC's Aberdeen Test Center on the final day of the workshop.

MIKE CAST serves in the Public Affairs Office at the Army Developmental Test Command Headquarters at Aberdeen Proving Ground, MD.

IMPLEMENTATION OF EVMS BY THE PM FOR CHEMICAL DEMILITARIZATION

Kathleen A. McDaniel, Jeffrey L. Kline,
and Gary D. Scheffler

Background

The mission of the Chemical Demilitarization Program (CDP) requires the destruction of all lethal U.S. chemical warfare-related materiel while ensuring maximum protection to the public, the personnel involved with the destruction effort, and the environment. The CDP also supports U.S. government programs that assist other nations in eliminating their chemical warfare-related materiel.

The CDP is currently designated acquisition category (ACAT) IC. Its current life-cycle cost estimate is $14.9 billion. The largest percentage of this cost goes toward building, equipping, and operating demilitarization facilities at eight locations around the country, as well as at the Johnston Atoll in the Pacific. The program schedule for weapons destruction supports U.S. treaty obligations designed to eliminate the U.S. chemical stockpile by April 2007.

In December 1994, the Under Secretary of Defense for Acquisition and Technology (now the Under Secretary of Defense for Acquisition, Technology and Logistics) designated the CDP as ACAT ID and directed management of the program be placed under the auspices of DoDI 5000.1, DoDI 5000.2, and DoD 5000.2-M. In addition, the contract cost and schedule management reports and procedures of DoDI 5000.2 were to be used. The major contracts awarded by the Program Manager for Chemical Demilitarization (PM, CD) to which the earned value management system (EVMS) is applied are for constructing, operating, and closing the chemical demilitarization facilities at the nine chemical agent storage sites. At the time of ACAT ID designation, work at two of the sites was already well underway.

EVMS was incorporated in the ongoing work at Tooele Chemical Agent Disposal Facility and on the Johnston Atoll Chemical Agent Disposal System. Beginning with the systems contract award for the Anniston Chemical Agent Disposal Facility in March 1996, all succeeding systems contracts have required EVMS compliance as part of the Request For Proposal.

Program Distinctions

Every program has distinctive features that influence the tailoring of the EVMS application. Some of these implemented by PM, CD are described below.

Funding Types And Sources. As shown in the pie chart on Page 34, Operations and Maintenance (O&M) is the largest funding type appropriated for chemical demilitarization contracts. O&M funds must be obligated within the year for which they are appropriated and expire after 1 year. Before each fiscal year, the required O&M work on systems contracts is defined, negotiations occur, and contracts are modified.

The procurement (PROC), O&M, and research and development (R&D) funds for both the stockpile and non-stockpile programs are provided through the Chemical Agents and Munitions Destruction, Army Appropriation. Military construction (MILCON) funds for the CDP are requested and funded separately through the U.S. Army Corps of Engineers. The construction efforts (including process equipment furnishing and installation) related to the Anniston, AL; Umatilla, OR; and Pine Bluff, AR; chemical agent disposal facilities are separate fixed-price elements of the respective total systems contracts. The other elements of those contracts are managed on a cost-plus-award-fee (CPAF) basis. Because Aberdeen, MD, and Newport, IN, systems contracts are part of the pilot test program for the chemical neutralization processes, construction is managed on a CPAF basis. The PM, CD management approach is to assume a

single integrated contract with appropriate links between all scheduled activities.

Program Phases. The life cycle for the demilitarization process is divided into major activity phases. These phases are design, construction, system-ization (system integration, testing, and proveout), chemical agent disposal operations, and facility closure.

Numerous Stakeholders. The CDP has numerous programmatic stakeholders. Some of the major ones and their missions include the following:

• The Industrial Operations Command provides procurement and legal support for systems contracts.
• The U.S. Army Engineering and Support Center, Huntsville, AL, provides engineering support for the construction aspects of systems contracts and administrative contracting officer support for the firm-fixed-price construction phase of certain contracts.
• The U.S. Environmental Protection Agency (EPA) works closely with PM, CD to comply with environmental regulations and permit conditions.
• The National Research Council (NRC) performs an oversight role for the CDP on behalf of the Army. The NRC draws expertise from the National Academy of Sciences, which has been chartered by Congress to advise the federal government on scientific and technical matters.
• State environmental agencies receive a Delegation of Authority from EPA to permit demil facility construction and operation. In turn, they monitor conformance to combined federal/state environment permit conditions.

Chemical Weapons Convention Requirements. The program schedule is driven by requirements to meet conditions

PROC
18%

R&D
7%

O&M
65%

MILCON
10%
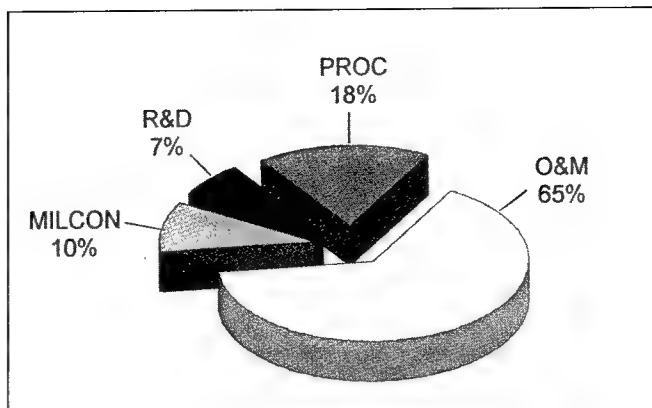
Chemical demilitarization funding types

of the Chemical Weapons Convention (CWC). Currently, the CWC mandates destruction of the stockpile by April 2007.

Program Evolution

Since 1994, the PM, CD Office has evolved from an organization focused on engineering design to one focused on direct oversight and management. EVMS is the primary management tool used at all sites and at program headquarters. The PM office currently has systems contracts awarded for seven of the nine stockpile sites.

Specific EVMS Initiatives

The following addresses the steps taken by the PM office in the past 5 years to effect EVMS change.

Management Involvement. The PM, CD chain of command has supported the implementation and use of EVMS as a management tool. Resources were made available by DA and the Office of the Secretary of Defense to assist PM, CD in the implementation.

Training For Management. PM, CD remains committed to providing quality training for management and technical staff. To increase the effectiveness of training, PM, CD worked with the Defense Systems Management College (DSMC) to tailor existing training pack-

ages to meet program needs and to take this training to our sites. Part of our approach has been to invite our industry partners to participate with us in training. This has helped to foster open dialogue.

PM, CD has worked with DSMC to develop tailored integrated baseline review (IBR) and EVMS analysis training. This training was conducted at our headquarters and at a number of sites. DSMC has participated in our IBRs to better understand program-specific requirements.

Tailored Approach. PM, CD uses a tailored approach to implement EVMS. When we started, we decided to use integrated product teams to provide assistance to the system contractors (SCs). Our approach was developed to meet the challenge of implementing EVMS on two existing contracts that had been underway for several years. This approach has been successful. We routinely conduct joint reviews as well as open meetings with the contractor and the PM, CD site office.

The U.S. Army Materiel Command (AMC) has provided participatory EVMS oversight to the program, thus allowing AMC to work with each SC in validating their EVMS compliance. Concurrently, SCs assist the PM, CD site project managers who conduct IBRs to ensure baseline validity.

The number of personnel involved in the IBR and the length of time they are involved depend on the scope of the review. IBRs are very useful to evaluate replanning as a result of significant funding cuts. They are also used to examine the baseline developed for major phases of the program, such as systemization or operation. Subject matter experts are used by the program as required.

Training, coupled with the actual experience of conducting an IBR, has resulted in technical ownership and use of the data by the technical community.

Electronic Data Interchange (EDI). As part of the overall shift by DOD to a digital environment, the program has kept pace through involvement in defining standardized methods of handling EVMS data. PM, CD has been a member of the DOD EDI Working Group on Project Management Data, which has been instrumental in defining the technical aspects of data exchange.

Programmatic Lessons Learned Program. PM, CD has instituted a programmatic lessons learned program that uses a database to track potential or actual program risk areas. While most of the information being tracked refers to technical data, the sharing of lessons learned during implementation of EVMS is part of that process. Formal lessons learned workshops addressing management issues are held semiannually allowing contractor staff; site managers; PM, Chemical Stockpile Disposal site staff; and PM, CD headquarters staff to meet to exchange problems, solutions, innovative approaches, etc. Over time, this has proven to be a valuable tool. We will continue to use it to improve EVMS implementation.

EVMS Data Analysis. Data produced by the systems contractor's EVMS is acquired through the preparation of monthly cost performance reports. The program office uses a variety of software tools and analytical techniques to verify and validate the submitted data. A monthly analysis compares the status and performance of the projects with other available data. Other data include the master schedule, munitions destruction tracking charts, and daily operations reports or other physical completion reporting system. This comparison is part of the overall analysis. Various levels of the management chain receive the analysis for review and discussion. PM, CD project personnel receive individual briefings on the status and potential impacts reported. In addition, PM, CD makes this information available on the electronic

interface, which is an electronic "war room" of program information and is generally available to anyone in the program needing the information.

Challenges

By the end of the second quarter of FY01, PM, CD plans to have compliant EVMS systems at all seven sites for which contracts are currently awarded. We will leverage our existing resources by continuing to institutionalize EVMS, making optimum use of electronic data handling and analysis and emphasizing our training program.

Lessons Learned

A number of lessons learned resulted from the EVMS implementation process. A discussion of three of these follow.

Management Attention Matters. Management attention cannot magically make problems go away. It does, however, accelerate their resolution. EVMS implementation generally occurred more smoothly when both industry and government managers focused their time and attention on the systems contract. We have observed that the quality of the data is higher if managers use the EVMS data.

Training Is Essential. When the PM, CD was designated an acquisition program, many personnel involved with the program had limited experience with EVMS. An intensive training program was instrumental in instituting EVMS as the main management tool in the PM, CD's Office. We partnered with DSMC to develop tailored 2-day training classes focusing on particular topics such as IBR training and EVMS analysis. This approach has been very successful. Taking the training to the site has allowed greater participation by both the government and our industry partners. A good training program is essential to making change happen.

Develop Your Own EVMS Recipe. A "cookbook" approach to implementing

EVMS will not work. EVMS must be tailored to particular situations. PM, CD finds that EVMS principles can be adapted successfully to our program.

KATHLEEN A. MCDANIEL works in the Program Evaluation and Integration Office for PMCD, where she is responsible for program acquisition reporting and EVMS implementation oversight. She has a B.S. in natural science and an M.B.A. She is Defense Acquisition Level III certified in both the logistics and test and evaluation management fields.

JEFFREY L. KLINE works in the Program Evaluation and Integration Office for PM, CD where he is responsible for EVMS implementation oversight. He has a B.S. and M.S. in physics and an M.S. in engineering administration. He is Defense Acquisition Level III certified in both the project management and system planning, research, development, and engineering fields.

GARY D. SCHEFFLER, an employee with Science Applications International Corp., has more than 20 years of managerial and professional expertise in the development of planning, scheduling, and performance measurement systems. He holds a B.S. in business and an M.B.A.
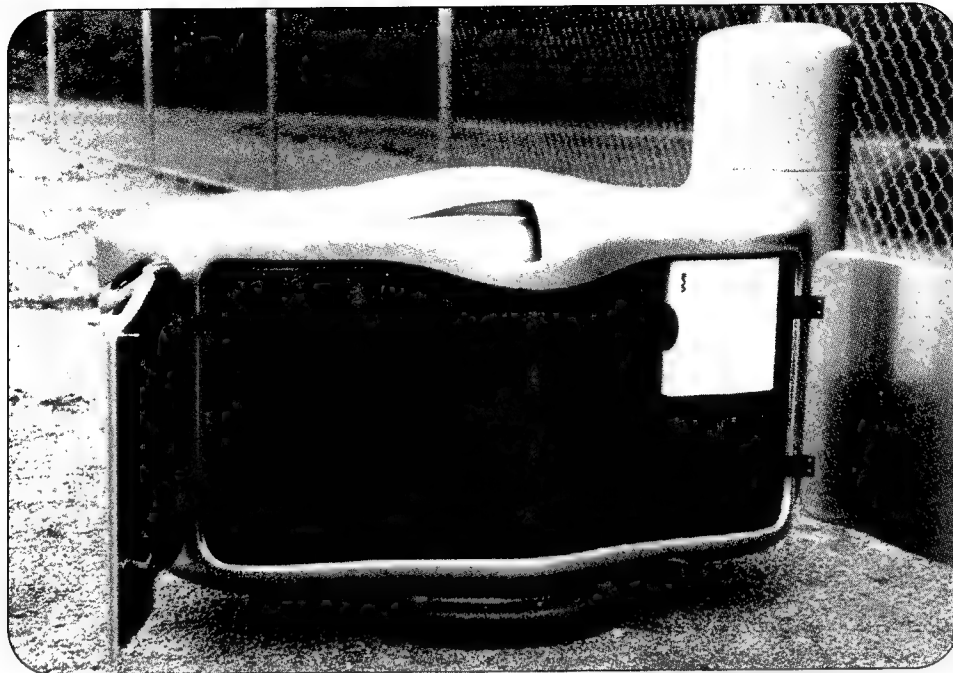
Portal Shield Mark III sensor

THE PORTAL SHIELD BIOLOGICAL WARFARE AGENT DETECTION SYSTEM

Brian David

Introduction

The Portal Shield Biological Warfare Agent Detection System, DOD's first automated biological detection system to protect overseas fixed-site facilities such as airfields and ports, is considered an excellent example of acquisition streamlining and acquisition reform. In fact, the U.S. Army Joint Program Office for Biological Defense (JPO-BD) Portal Shield Team was selected as a David Packard Excellence in Acquisition Award winner for rapid development and fielding of the system.

Background

In 1996, the JPO-BD initiated the Portal Shield Program as an Advanced Concept Technology Demonstration (ACTD) to address the potentially devastating consequences of a biological warfare attack against high-value overseas targets such as airfields or port facilities. The Portal Shield System consists of a variable number of fully automated biological sensors that form a network under the command and control of a centralized command-post computer. Using a network of sensors to confirm the presence of biological warfare agents reduces false positives and critical consumables. The biological sensors are modular in design and can detect up to eight threat agents simultaneously in less than 25 minutes. The prototype Portal Shield was ready for action in less than 2 years from concept to deployment. The Mark II prototype system was successfully deployed to Kuwait in support of Operation Desert Thunder in 1998. The Mark III system, which is the most current version, was produced the following year using several acquisition reform techniques and concepts described below.

Pit Stop Design

Biological detection technology is evolving rapidly. Change is one of the basic tenets used by the JPO in developing the Portal Shield's modular design. The current Mark III sensor is the third generation of a continuous improvement design philosophy (photo above). A design consultant at Carlson Technologies

The Portal Shield Program successfully used several acquisition reform initiatives to break the acquisition mold and field the first fully automated DOD biological detection capability in record time.

was brought in early in the program to help produce a "vision piece." The consultant's background in auto racing resulted in a push toward simplifying the servicing of the sensor. The Portal Shield Team viewed servicing of the sensor as if it were a "pit stop" during an auto race. The result is a plug-and-play Mark III sensor that can be assembled without tools in 2 minutes and be upgraded as new technology and components become available, a concept known as modernization through spares.

COTS

To reduce acquisition cycle time and total ownership costs, the Portal Shield Team took maximum advantage of various acquisition reform techniques, including commercial off-the-shelf (COTS) items. Approximately 90 percent of the Mark III sensor is made from COTS or modified COTS parts. Built-in red and green test diodes were designed into the front cover of each sensor plug-and-play module to allow the operator to quickly determine if the module is in proper working order.

In anticipation of future product improvements, each sensor plug-and-play module includes a tiny memory device with 65,000 bits of read/write nonvolatile memory and more than 10 years of data retention. Each sensor plug-and-play module can be read with a Palm computer-sized reader. The memory devices will allow for life-cycle maintenance such as equipment inventory, preventive maintenance scheduling, fault reporting and recording, problem self-diagnosis, and failure analysis.

Real-World Operation

The Portal Shield Team lived the "continuous improvement" philosophy. For example, the system successfully passed three field trials in rapid succession from 1996 to 1998. Its performance improved with each trial. The program's ACTD Military Utility Assessment (MUA) was a success and was the largest outdoor simulant field test ever conducted at Dugway Proving Ground, UT, in September 1998.

However, the only test that really matters is the one that answers the question of how the device will operate in a real-world situation. The prototype Mark II system that was deployed in support of Operation Desert Thunder operated successfully for more than 4 months under extreme environmental conditions. Numerous hardware and software design changes were rapidly incorporated into the Mark III system based on this real-world operation.

Tailoring Authority

Based largely on the success of Operation Desert Thunder, a directed procurement for additional Portal Shield systems was issued to the JPO-BD in late 1998. In addition, operational need statements were signed by the two commander-in-chief (CINC) ACTD sponsors (U.S. Pacific Command and U.S. Central Command). The Joint Program Manager (JPM), as the milestone decision authority for biological detection systems, issued an acquisition decision memorandum in January 1999 transitioning the Portal Shield ACTD into the production phase. Portal Shield is one

of only two ACTDs since 1995 to have successfully transitioned into production.

Conclusion

There is a saying: "success comes in cans ... not in cannots." David Packard, former Deputy Secretary of Defense, would have probably agreed to this sentiment when it came to acquisition reform. The Portal Shield Program successfully used several acquisition reform initiatives to break the acquisition mold and field the first fully automated DOD biological detection capability in record time. The Portal Shield sensor can be modernized through spares to meet emerging threats and technology improvements. Its modularity and built-in diagnostics will lead the way in reducing total ownership costs for the next generation of biological detection systems.

BRIAN DAVID is the Director for Technology Transfer and Engineering in the JPO-BD, Falls Church, VA. He holds an M.S. in mechanical engineering from Catholic University, an M.S. in engineering administration from The George Washington University, and a B.S. in aerospace and ocean engineering from Virginia Polytechnic Institute and State University.

ACCESSING ARMY ACQUISITION POLICIES

Joe R. East Jr.

Acquisition policies guide and govern the systems acquisition process. These policies serve as the building blocks for the life-cycle model. Each policy either ensures that previous mistakes are not repeated or provides direction in implementing new initiatives. The desired results of these policies are to:

• Produce essential military systems that enable our forces to meet our national objectives,

• Encourage technological innovation,

• Provide systems that are easy to use and repair as well as cheap to operate and maintain, and

• Provide the best value for the taxpayer.

Simultaneously, acquisition policies underwrite domestic objectives such as:

• Maintaining a diversified development and production base,

• Ensuring that small businesses are not excluded from the Defense industry, and

• Eliminating environmental damage.

The number of policies governing these multifaceted goals is staggering. Every functional area contributing to systems acquisition is governed by acquisition policies. Requirements generation, threat support, research and development, cost estimating, budgeting, contracting,

logistics planning, testing, fielding, and program reporting are examples of functional areas governed by a myriad of acquisition policies.

A few years ago, these policies were found in a wide range of printed documents such as:

• *The Federal Acquisition Regulation*;

• *The Defense Federal Acquisition Regulation*;

• *The Army Federal Acquisition Regulation*;

• DOD directives, instructions, and regulations;

• Army regulations;

• Army Materiel Command (AMC) regulations; and

• Army Training and Doctrine Command (TRADOC) regulations.

Procedures designed to help implement acquisition policies were printed in

Every functional area contributing to systems acquisition is governed by acquisition policies. Requirements generation, threat support, research and development, cost estimating, budgeting, contracting, logistics planning, testing, fielding, and program reporting are examples of functional areas governed by a myriad of acquisition policies.

DOD handbooks and military standards and Army, AMC, and TRADOC pamphlets and handbooks. Updating these documents, posting changes to them, and searching for all applicable policies and process guidance was a large and difficult administrative chore. Fortunately, the *Paperwork Reduction Act* and the Internet have eased this chore by creating a new distribution medium for many of these policy documents.

In particular, the Defense Acquisition Deskbook, a compilation of many common acquisition policies used by the Services, consolidates acquisition policies and procedures into one location in an electronic format. The DOD Deskbook is updated quarterly, published on the Internet, and available on compact disc. Additionally, the DOD Deskbook includes a keyword search engine designed to quickly review hundreds of documents and identify exact sources.

The Department of the Army, AMC, and TRADOC have included their publications on their respective Web sites. While these sites may have search engines, they are not as user friendly or efficient as the DOD Deskbook search engine. Furthermore, not all Army regulations and pamphlets are hosted on

Publications

Army and DoD	Other Publications	Search Engines

back to	Acquisition Links	MAM homepage	SAM homepage	ALMC homepage

Army and DoD Publications

Army Regulations & Pamphlets		DoD Publications	DoDISS	DOT&E FY98 Rpt
Field Manuals	TRADOC Pubs	DoD Deskbook	DSP Library	STINET
FY 00 Greenbook	TRADOC Regs	ASSIST	DoD Reform Rpt	2000 Annual Rpt
AMC Pubs	TRADOC PAMs	Dictionary	Commerce Business Daily	
AMC Policy	Acronym Finder	Army Acronyms	FY 2001 DoD Budget	

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Other Publications

	Publications and References	
Search Engines	Signal	MilitaryOnLine

the Army's Web site. Despite these minor shortcomings, the Internet is the best place to search for publications related to the Army acquisition process.

Recognizing a need for a central location for searching the Internet for Defense and Army-related acquisition policies, I have created a Web page containing links to policies affecting the Army acquisition process. The home page layout of this site is shown above and is located at **http://www.almc.army.mil/ AMD/ALMC-ML/publications.htm.** This site contains a link to other sites with links to organizations, personnel issues, travel, and functional-specific Web pages. Because I may have overlooked linking an important site, your suggestions for improving these Web pages are welcome.

JOE R. EAST JR. is a Course Director for the Materiel Acquisition Management Course at the U.S. Army Logistics Management College, Fort Lee, VA. He has an M.S. in management from the Florida Institute of Technology and is Level III certified in program management.

LANGUAGE MOS EVALUATION PROGRAM

SGT Robert Laposta

Introduction

With military linguists deploying to numerous operational areas in recent years, foreign language technical operational proficiency has become increasingly important for mission success. As such, commanders have used both local language training programs and expensive in-country study programs to increase linguists' proficiency, as measured by the Defense Language Proficiency Test. These programs, however, fail to provide adequate training for linguists to perform linguistic tasks within their Military Occupational Specialty (MOS) of collecting human intelligence (HUMINT) and signals intelligence (SIGINT).

Language MOS Evaluation Program

The Language MOS Evaluation Program (LMEP) is designed first to evaluate a military linguist's foreign language technical proficiency. Unit commanders can then review the results and, using the unit-training meeting and the Command Language Program Manager, develop an effective training plan to increase and reinforce technical language proficiency. LMEP includes an interactive, CD-ROM-based training program designed for specific technical, task-based language training to augment the unit commander's training program for the HUMINT linguist. A program tailored for the SIGINT linguist is under development.

Development

The U.S. Army Intelligence Center and the Fort Huachuca Language Branch Office developed the interactive LMEP training program working under a Cooperative Research and Development Agreement with Courage Software of Olympia, WA. LMEP is a manually scripted Asymetrix ToolBook application focused on task-based language training.

The initial responsibility for developing LMEP required identifying those tasks within the 97E Interrogator MOS that require foreign language proficiency. The tasks are source screening, document exploitation, interrogation planning and preparation, interrogation, and interpretation. Grading criteria were based on actual job performance; that is, how would the linguist be expected to perform this task on the battlefield? For example, the interrogation test is not graded by how well the interrogator linguistically interacts with his source, but how complete the intelligent SALUTE (size, activity, location, unit, time, equipment) reports are from available information within the scenario.

Initial testing indicates that linguists are not comfortable enough with technical language to be fully effective on the battlefield. During an interrogation, linguists focus primarily on operating within the common foreign language. They become

***With military linguists deploying
to numerous operational areas in recent years,
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so focused on translating the next interrogative and translating the source's response that attention to their technical MOS skills decreases and they become less effective at collecting intelligence.

The interactive CD-ROM is the training support package for the evaluation tests. The goals in creating an effective interactive training application were to include target vocabulary lists that would enhance a linguist's exposure to technical vocabulary and provide exercises within the application that supported specific MOS task training. Word lists were taken from technical glossaries available from the Defense Language Institute, National Ground Intelligence Center, and other open source references. Although interactive vocabulary drills relying on both visual and aural reinforcement are a significant portion of the application, several other exercises are included that answer specific technical training requirements.

Design And Content

The initial version of LMEP was designed for Korean HUMINT linguists.

The Korean font is supported under all English Windows™ operating systems, and it requires no Korean operating system support. The shell of LMEP was designed as a language-independent template. Content for any other foreign language can be easily exchanged with the present content simply by importing new text and audio files. The shell will work with Arabic, Chinese, Indonesian, Thai, and any Roman language. Other languages are being tested.

Because LMEP supports a linguist's technical language training, the vocabulary database contains approximately 6,500 vocabulary entries focused on North Korean military and government terminology. The vocabulary is presented in seven visual exercises ranging from simple visual and audio playback of a vocabulary set to advanced true and false and matching exercises. There are two aural exercises. The first exercise offers the linguist an audio file vocabulary word in Korean that the linguist must identify from a group of eight English translations. The second and more advanced

exercise plays a Korean audio file (either a word from a vocabulary group or a sentence from a dialog group) and requires the linguist to correctly translate the audio file into a text box.

Positive reinforcement is designed into all exercises. The CD-ROM program has more than 10,000 audio files that offer voice audios of all the written content within the LMEP application for secondary sensory reinforcement.

The program can dynamically generate a number of puzzles and quizzes that linguists can solve either within the program or after printing them. These exercises come from the available database set that the linguist selects and can change at any time. They offer the individual linguist interactive vocabulary play as well as a supervisor or instructor the ability to print out a language exercise or quiz in 1 minute.

The application also contains sets of HUMINT-specific exercises designed to give linguists training with their MOS task set. Linguists can listen to dialogs and "submit" reports on what they've heard, evaluate documents against a set of priority intelligence requirements, and translate documents to a set of criteria.

To specifically enhance an interrogator's target language technical training, the program offers an "Interrogator's Notebook." The notebook contains 444 full-sentence questions following a questioning guide exploiting all order of battle intelligence areas. The questions in the notebook follow all current doctrinal guidelines. As such, it is the most complete and technically correct translated questioning guide available to the interrogator linguist. These questions are supported by 4,440 typical audio responses (10 for each question) an interrogator would receive upon asking a question of a source. This content exposes interrogators to a wide array of vocabulary, tactical information, and specific terminology in both text and audio format that they otherwise would not have available outside of an in-country tactical exercise. Reinforcement exercises within LMEP are designed to specifically reinforce the content of interrogation questions and their responses.
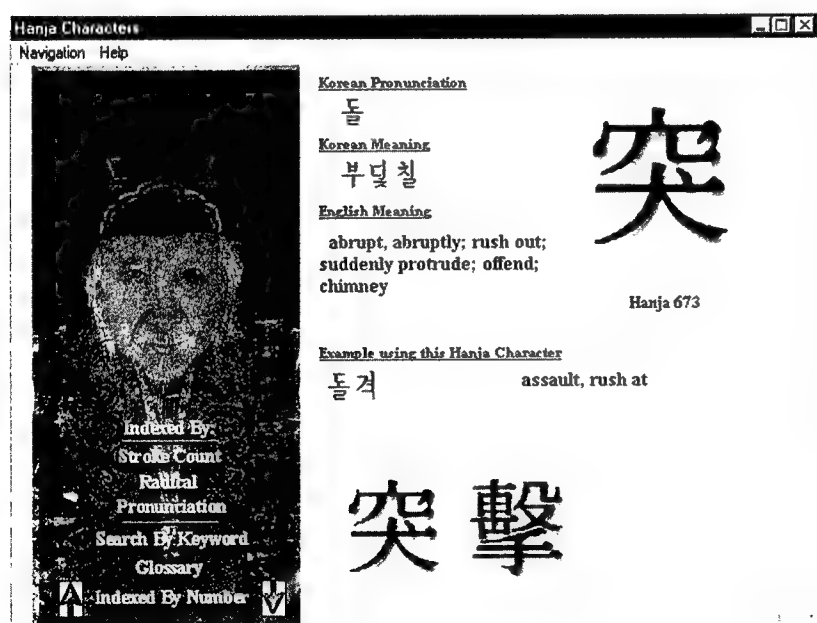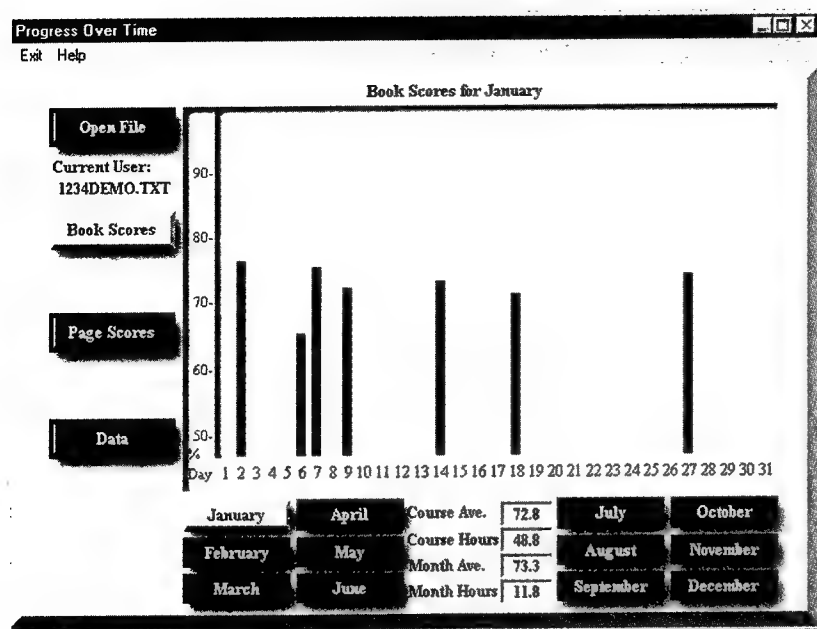

Figure 1.
Hanja training module

Figure 2.
Technical operation skills evaluation module

LMEP also offers the linguist a number of references on the target country. Military rank identification, country study handbooks from the Library of Congress, and geographical familiarization modules are all programmed into the application.

LMEP also allows linguists or language administrators to add their own content. If a specific mission-training plan requires content not included in the database, it can be easily developed and included within the application exercises.

Hanja Trainer

LMEP also incorporates a trainer for Hanja, the Chinese characters used within the Korean language (Figure 1). This module allows the linguist to become more effective in evaluating open-source documents for intelligence information. Included are the 1,800 Hanja identified by the Korean educational system to be taught at the high school level.

To offer the linguist a complete training reference on Hanja, the module is indexed by stroke count, radical (equal to a Latin root in English), pronunciation, and English translation. Linguists can view the pronunciation, the Korean meaning, and the English translation of each Hanja. Reinforcement exercises include a number of "drag and drop," "multiple choice," and "matching" exercises that familiarize the linguist with the Hanja based on the Hanja's Korean meaning, English translation, or pronunciation. These exercises are supported by a "Create a Word" exercise where linguists are presented with a set of Hanja that they must properly place to create the given word.

The Hanja trainer can also teach character stroke order, an important skill in learning Hanja characters. This module, unfinished in character imaging but complete in ToolBook code, offers both the linguist and the language instructor an invaluable training asset.

Performance Tracking

LMEP has two methods of providing feedback to its users. The "Book Progress" page allows a linguist to view individual page performance errors within the entire application before exiting the current use. All incorrect responses are logged and viewable within the program along with information on number of attempts, correct and incorrect responses, and the time on task for each exercise. The program clears the information upon each exit.

The "Progress Over Time" page (Figure 2) allows an administrator (or a linguist) to view a graphical representation of the linguist's performance within the program based on monthly or daily graphs. Information on overall program performance average and time on task as well as individual module average and time on task are viewable. A printout of all information also allows archiving and tracking a linguist's progress. This information is kept as a generated text file for each individual user (based on login) and is updated with each use.

Conclusion

LMEP offers the linguist the opportunity to train interactively within a target language. Exercises within LMEP are specifically designed to support training on specific MOS language tasks required on the battlefield. The linguist can train in the unit language lab or at home, a tremendous asset to U.S. Army Reserve and Army National Guard linguists.

LMEP allows the unit commander to evaluate unit linguists on their ability to perform the battlefield mission by pointing out their strengths and weaknesses. It also offers a cost-effective method of training unit linguists (LMEP is freely licensed to the U.S. government) in specific technical language requirements.

SGT ROBERT LAPOSTA is a Training Developer/Writer in the Language Branch Office at the U.S. Army Intelligence Center and School, Fort Huachuca, AZ. He attended the Defense Language Institute for Korean and is a graduate of the Basic Noncommissioned Officer Course.
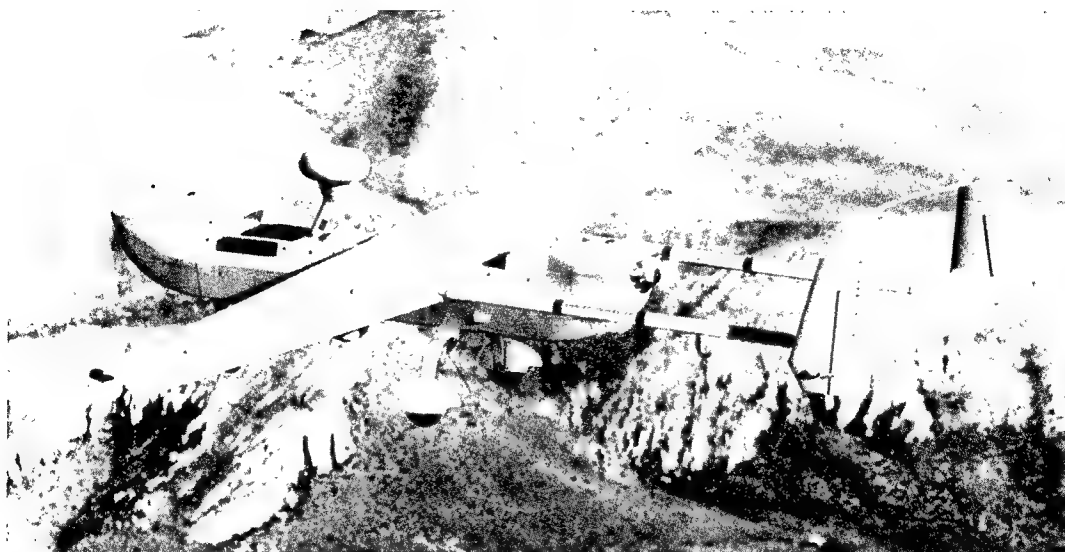
The ability of the Hunter UAV to penetrate enemy airspace and remain over target areas is essential to warfighters and represents a vital link to other reconnaissance vehicles and platforms.

HUNTER UNMANNED AERIAL VEHICLE SYSTEM

William L. Smithson

Introduction

The RQ-5A Hunter Unmanned Aerial Vehicle (UAV) System (hereafter referred to as Hunter) was deployed to the Balkans to support Operation Allied Forces and work with the NATO forces over Kosovo. Based in Macedonia, Hunter began flying missions over Kosovo on April 4, 1999. However, operations ceased as of late October 1999 because of weather conditions. Hunter's mission in the Balkans was accomplished through more than 3,800 hours of flight time to date, a very high operational tempo (OPTEMPO) for any aviation system. These flight hours have contributed to marking another milestone for Hunter. The first Hunter began flying in March 1991, and has since logged nearly 12,000 flight hours. The value of UAVs in a war zone has become readily apparent to DOD.

Hunter Capabilities

The ability of Hunter to penetrate enemy airspace and remain over target areas is essential to the warfighters and represents a vital link to other reconnaissance vehicles and platforms. Hunter's imaging

systems allow commanders sufficient time to detect, identify, and track hostile activities; target them with weapon systems or maneuver against or around them; and conduct battle-damage assessment. Furthermore, Hunter enhances the commander's ability to locate and identify friendly forces, locate the legitimate enemy targets, and avoid unnecessary loss of life.

Through the ongoing Payload Demonstration Program, Hunter will soon demonstrate its ability to detect biological and chemical weapons, see into dense jungles, and provide low-cost reliable communications across the battlefield.

Hunter's advantage is its ability to give commanders an invaluable surveillance tool without placing the pilot in harm's way. Imagery and data that once took hours to process and communicate are now processed in a matter of minutes. For the first time, commanders and target analysts have virtual, real-time information on battlefield conditions and potential targets.

The environmental stress factors in the Balkans (high altitude, mountainous terrain, poor weather conditions, and the relatively sophisticated air defenses) provided an

extreme test of the Hunter. Because of line-of-sight constraints, Hunter operated a majority of missions in a relay mode, requiring a minimum of two air vehicles (AVs) flying simultaneously for extended range.

The Kosovo mission was the first time Hunter was used in OCONUS operations. For the past 4 years, Hunter, which was operated by the 15th Military Intelligence (MI) Battalion (Aerial Exploitation) at Fort Hood, TX, participated in the Army's digitized unit experiments and supported rotations at the National Training Center (NTC) at Fort Irwin, CA. The last NTC rotation was conducted in mid-February 1999, 1 week before the unit was ordered to Europe to support the NATO mission in the Balkans.

Balkans Deployment

The Hunter System and the 15th MI Battalion, under the command of NATO Supreme Allied Commander Europe General Wesley Clark, deployed with personnel from the 3rd Weather Squadron at Fort Hood. In addition, through a contractor logistics support contract, the prime

contractor, TRW, provided depot support and a collocated team of technical operators and maintainers from its depot in Sierra Vista, AZ. This feat was a first for Hunter. Equipment was taken from long-term storage and readied for the war effort. This equipment included AVs, Ground Control Stations (GCSs) and Mission Planning Stations (MPSs), Ground Data Terminals, Multi-Mission Optronic Stabilized Payload, and other associated ground support equipment.

TRW accomplished an overwhelming amount of work in a short period. Its depot facility operated around-the-clock to complete activities in required asset preparation and maintenance testing prior to shipment via military and commercial aircraft. Additionally, essential spare parts were secured and shipped with the subsystems. Because of the OPTEMPO, OCONUS demand was high for more spare parts; therefore, TRW established and maintained a spare parts pipeline via a regional logistics support center, with daily shipments to the forward location.

Lessons Learned

Lessons learned from the deployment will benefit future UAV operations. Some of these lessons pertaining to communications, operations, logistics, and personnel and training are detailed below.

Communications

Ultra-high frequency radio communications were needed for air traffic control (ATC) coordination. The STU-III phones and SIPRNET e-mail were used for secure communications. Motorola hand-held radios and Hunter PRC-126 radios met the portable communication needs of the GCS/MPS and the Line Chief. Live video feeds were delivered to the commanders, the Pentagon, and other essential areas through the Joint Broadcast System.

Operations

Wartime operations in NATO-controlled airspace require Mode IV identification friend or foe. More than half the missions were launched before the target sets were established and were often

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HUNTER UAV TECHNICAL DATA

Weight (Empty):	1,170 pounds (532 kilograms)
Max. Takeoff Weight:	1,600 pounds (727 kilograms)
Max. Payload Weight:	270 pounds (125 kilograms)
Length:	23 feet (6.9 meters)
Wingspan:	29 feet (8.9 meters)
Endurance:	11.6 hours demonstrated
Operational Range:	>125 kilometers
Range with Relay:	>200 kilometers
Cruise Speed:	60-80 knots
Max. Speed:	110 knots
Max. Ceiling:	15,000 feet
Payload:	Day/Night TV and Forward Looking Infrared
Launch/Recovery:	660 by 250 feet (200 by 75 meters) unimproved areas

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changed within the first 30 minutes of the mission, making prior mission planning ineffective. ATC restrictions imposed on the inbound Hunter AVs dictated holding areas. Severe weather and thunderstorms often overran these holding areas. To prevent excessive holding delays, more reasonable priority should be negotiated with ATC. Hunter AV operators need improved tactical identification training, and mission payload operators need greater discipline in search and scan techniques when given an area to investigate.

Logistics

Establishing the logistics deployment procedures and practices early is very important because these practices are liable to change whenever the responsible unit changes personnel. Packing and shipping material must be provided and obtained as part of deployment preparations. Saving packaging materials from incoming items is a must because they may be the only material available in which to return the replaced items to depot. Standard parts shipping containers would be helpful, especially if they can withstand the pressure of tie-down straps used on pallets.

Personnel And Training

Unit personnel gained proficiency in all areas, but very few will return to school to relate their experience to instructors. Recent graduates needed better procedural discipline to establish a firm routine. Paperwork discipline needs improvement at both the unit and training level, and arriving soldiers need to receive unit-specific paperwork requirements in a more timely manner. Many new soldiers received addi-

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tional on-the-job maintenance training.

The Hunter Tactical Unmanned Aerial Vehicle (TUAV) Project Office in Huntsville, AL, has taken the lessons learned that fall within their control and initiated the appropriate corrective actions.

The TUAV Project Office is under the leadership of Project Manager COL Michael A. Hamilton and Deputy Project Manager John C. Sundberg. They report to Edward T. Bair, Program Executive Officer, Intelligence, Electronic Warfare and Sensors, at Fort Monmouth, NJ.

Note that the project office has taken actions in the past to improve Hunter System hardware and software reliability, which has far exceeded its specification requirements. The Hunter Operational Availability requirement is 0.85 while the current demonstrated Operational Availability is 0.98. The accompanying chart shows general Hunter UAV technical data.

Conclusion

Unquestionably, the Hunter Unmanned Aerial Vehicle System proved its value during its service in the Balkans. With continuing and consistent improvements, it will most assuredly be a tremendous asset to the soldier and allied forces in future conflicts.

WILLIAM L. SMITHSON is a Configuration Management Specialist in the Configuration Management Division, System Engineering and Production Directorate, Missile Research, Development and Engineering Center, U.S. Army Aviation and Missile Command. He holds a B.S. degree from Athens University. He is a member of the Army Acquisition Corps and is Level III certified in systems planning, research development, and engineering and Level II certified in program management.

Introduction

Look at any of the news related to our military and you can see how the miniaturization of electronics has transformed warfighting methodology. Not long ago, the outcome of a battle could be determined by which side had the most troops and firepower. The most important resources were bullets, food to sustain the troops, and fuel (i.e., gasoline and diesel) to power armored vehicles, trucks, and aircraft.

Brute force will not always ensure victory in future battles. With the advent of the "digital battlespace," future battles will not be won by the side that has the most men and arms, but by the side that has the overwhelming ability to obtain, process, and distribute information that enables the effective application of manpower and firepower against the enemy. As a result of the ongoing revolution in electronics, this information is no longer the sole purview of the upper echelon of command, but is generated by, and distributed to, the individual.

The average small unit of warfighters no longer has just a radio. It is equipped with night vision goggles, Global Positioning Systems, thermal imaging systems, laser rangefinders, and a wide range of other electronic and communication systems that increase the warfighter's lethality and enhance the warfighter's survivability, mobility, and independence. Furthermore, each of these systems requires a manportable power source. As the Army continues to develop the soldier into a stand-alone weapons system, the ability to provide manportable electrical power may prove to be the modern warfighter's Achilles' heel.

Portable Power

Although all platforms would benefit from improved power sources, portable power design parameters are most critical for the individual warfighter. A manportable power source must meet various mission profiles, have a high capacity (to complete an entire mission), be lightweight (to minimize the soldier's load), be readily available (to support increased demands during a deployment), and be

MEETING THE POWER REQUIREMENTS OF THE DIGITAL BATTLESPACE OF THE FUTURE

Marc D. Gietter

cost effective (to meet the declining peacetime budgets). In the past, the solution was to develop a better battery. This approach was acceptable when advances in electronics and increased battery capacity were parallel, resulting in no overall impact on weapon systems development. However, the dramatic increase in capabilities and power demands of new systems may now outpace the ability of small, lightweight power sources to meet mission requirements. Thus, the advances in electronics technology incorporated into new systems may be overcome by the increased weight and number of batteries required to power these systems.

Center Of Excellence

To respond to the challenge of meeting the power requirements of the current and future Army, the Army Materiel Command designated the Army Communications-Electronics Command (CECOM) as the Power Sources Center of Excellence (PSCOE). PSCOE is addressing the problem of power consumption using a systemic approach called Integrated Power Management (IPM). IPM is the designed administration of energy-efficient technologies and techniques across all elements of power: sources, storage, distribution, and consumption.

The IPM approach is built on three distinct but related "pillars": power gener-

ation, power management, and power as an integral variable (PAIV). Power generation comprises all energy sources, including solar devices, batteries, trailer-mounted generators, and alternative sources. Power management will be used to develop design tools to develop power-efficient systems. The third pillar, PAIV, is the process by which power consumption and generation are integrated into the development and source selection process for all electronic systems. PAIV is discussed in greater detail later in this article.

Power Generation

PSCOE is investigating a wide range of power generation sources including thermophotovoltaics, fuel cells, energy-harvesting systems, solar panels, and microturbines. These power sources show potential, but are considered long-range solutions. Short-term solutions are based on traditional approaches, including generators for large applications (such as tactical operations centers) and batteries for individual warfighter systems.

Relative to batteries, PSCOE has leveraged advances from the commercial market. These have been driven by the consumer electronics industry. The most promising commercial technologies include the lithium manganese dioxide "pouch" battery and rechargeable lithium ion batteries.

Battery Chargers

Charging batteries, once a slow and logistically burdensome process, is also getting increased attention. New, smart, efficient chargers are being developed. The goal of PSCOE is to have charging capabilities as close to the battlespace as possible. This is being accomplished by offering the warfighter a suite of charging alternatives, including benchtop chargers, vehicle-mounted chargers that can be used on the move, zinc air batteries and solar panels for remote locations, and smart cables to allow charging from multiple types of power sources.

Power Management

Although improved batteries are entering the inventory, they are not the ultimate solution. The emerging power-generation technologies must be augmented with the proper and efficient use of the power generated. Examples of IPM use are abundant. In the commercial market, the current generation of cellular phones has more features than ever, can operate for days (or weeks) using advanced lithium rechargeable batteries, and can fit inside a shirt pocket. An example in the military inventory is the Single Channel Ground and Airborne Radio System (SINCGARS) radio. The latest generation of this radio, the Advanced SINCGARS Improved Product, is 50-percent lighter, 50-percent smaller, uses 50-percent less power, and has more capabilities than the first-generation system fielded in the early 1990s. All this was accomplished by declaring a war on power consumption, or by "Thinking in milliwatts, not watts!"

The war on power consumption was conducted by using energy-efficient components, such as low-power electronics and software architectures ("sleep modes") that minimize energy consumption.

The Army has realized the importance of IPM by designating it a Horizontal Technology Integration (HTI) Program. The designation of IPM as an HTI Program allows the Army to standardize power technologies and sources across multiple platforms. Standardization

encompasses all facets of power, including the power source, software, hardware, and simulation tools. Currently, the focus is on an automated design tool to optimize system designs for power. This tool will be able to use standard hardware description languages or such as very high-level design language or "C" language to optimize the designs.

In conjunction with improvements provided by the design tool, an initiative is also being pursued to reduce power consumption via the software operating system as well as a system's application software. Industry is currently developing a "power aware" specification standard for future computers and hand-held devices. Called Advanced Configuration Power Interface (ACPI), it allows for various "sleep states." The benefit of ACPI is its ability to not only manage the power demands of the processor, but any and all peripherals such as printers, scanners, and cameras. ACPI is a good initial step in finding software solutions to reduce power requirements of more complex systems.

Power As An Integral Variable

Implementing the various methods to reduce power consumption is as important as the methods themselves. To this extent, the PSCOE champions PAIV. The goal of PAIV is to elevate the importance of reducing power consumption of Army equipment and systems via power management and the correct selection of the power-generating source. PAIV must become an integral part of the materiel acquisition process.

Although most effective if used early in the development cycle, PAIV can be applied anytime in the acquisition process, including during the acquisition of spares. In general, PAIV should be of greatest value in manportable systems. The key to making PAIV an achievable goal is to:

• Set realistic, but aggressive, power management objectives early in the acquisition process, beginning with advanced development contracts and ending with spare procurements;

• Devise appropriate metrics for tracking the progress in achieving power management goals and revising them as appropriate;

• Construct evaluation criteria for use during source selection that adequately denote the importance of power management; and

• Motivate contractors to improve contractual power management goals during system development and production.

CECOM's Logistics and Readiness Center (LRC) has recognized the importance of PAIV and implements power management in all phases of the life cycle of a weapon system managed by or to be transitioned to the LRC.

Conclusion

To meet the energy requirements of the future's digital battlespace, the PSCOE has declared war on energy consumption using its three major weapons: better power-generating sources, power management techniques built in the end item, and the use of PAIV in the development/source selection process. The ultimate goal is to provide our soldiers with highly effective and efficient power sources that minimize operating and support costs.

MARC D. GIETTER is a Project Leader on the CECOM LRC's Power Sources Team. He has been involved in battery- and power-related issues for more than 15 years. He has a B.S. in chemical engineering and an M.S. in engineering management, both from the New Jersey Institute of Technology.

FROM THE DIRECTOR ACQUISITION CAREER MANAGEMENT OFFICE

In my new capacity as the Acting Deputy Director for Acquisition Career Management, I have had the opportunity to speak with many of our Army Acquisition Workforce (AAW) members, and I am certainly privileged to support such an enthusiastic and spirited group. The training, education, and developmental assignment opportunities the Army offers its acquisition community are unequalled by the other Services. The excellent promotion rates we are witnessing for our Competitive Development Group (CDG) members is testimony to the Army leadership's understanding of the value of our programs.

As we begin distributing our Playbook 2000 and the new Acquisition Education, Training and Experience (AETE) Catalog, I encourage everyone to become familiar with and participate in our many programs. In a rapidly changing world, we need leaders who are flexible and creative and who understand the integration of multifunctional programs—leaders who have experienced the full range of program activities and have not limited their vision to a single career path and office. The Acquisition Career Management Office (ACMO) will continue to build on our current programs. Join us in building an even stronger corps of leaders for the Army of the future.

The CDG remains a cornerstone of what we are all about, and we are happy to announce the 26 new selectees for Year Group 2001 in this issue (see the article beginning on this page). The CDG Program provides leadership-intensive training and experience opportunities for competitively selected GS-12 and GS-13 Corps Eligible and Army Acquisition Corps (AAC) members. Each year the number of commands competing to have CDG members serve in their organization grows. The program is a proven winner for the Army acquisition community, and I encourage supervisors of eligible personnel to promote the exciting benefits of this program for expanding knowledge and experience.

The CDG orientation will be held in the National Capital Region the week of Aug. 7, 2000, to familiarize new members with the program and current AAW/AAC initiatives. During this same period, we will honor our first graduating class.

I also want to remind you that the biannual AETE Board meets again in August to select individuals to participate in the Operational Experience Program (OEP). I encourage you to participate in this outstanding training program. Additionally, for those of you seeking to "fine-tune" your management skills in an acquisition environment, I highly recommend the Naval Postgraduate School (NPS) distance learning program. Interest in this program is the basis for recent ACMO efforts to expand the number of distance learning sites. You can read more about the OEP and the NPS Program in related articles on Page 48.

AAW 2000 briefings have already been held at a number of sites. For details about the next briefing in your area, be sure to check the AAC home page at **http://dacm.sarda.army.mil/news/2000roadshow.htm**.

This is an exciting time for the Army acquisition community. Opportunities abound. Take a look at what we have to offer and get involved—your career and our Army will benefit.

COL Roger Carter
Director
Acquisition Career Management Office

Year Group 2001 Competitive Development Group Selected

A board was convened in February 2000 to select individuals for the Army Acquisition Corps Competitive Development Group (CDG) Year Group (YG) 01. Twenty-six individuals were selected from 109 applicants to participate in this specialized 3-year career development program. These individuals went through a rigorous board selection process for the opportunity to be provided expanded leadership and management training and cross-functional experience in the various acquisition career fields.

Congratulations to all those selected for this prestigious program! Selectees and their employing agencies are shown below.

Henry Alexander	AMCOM
Daniel Belk	AMCOM
Hari Bezwada	CECOM
Deborah Chambers	PEO, Aviation
Brian Churchman	TACOM
David Duda	DSS-W
Eric Edwards	AMCOM
William Ellis Jr.	PEO, Aviation
Bernard Gajkowski	STRICOM
Duane Gotvald	AMCOM
Ross Guckert	CECOM
Clarence Hamilton	CECOM
Timothy Hughes	SMDC
Robert Jamison	SMDC
Angela Kielsmeier	PEO, Tactical Missiles
Mike Lawrence	PEO, Tactical Missiles
Allen Poole	PEO, Aviation
Nevrick Ratliff	SMDC
Deborah Schumann	PEO, Air and Missile Defense
Dennis Simpson	STRICOM
Cassandra Smith	TACOM
Robert Thomas	CECOM
Stephen Tkac	PEO, STAMIS
Beverly Wasniewski	TACOM
Diane Williams	PEO, Air and Missile Defense
Kenneth Wright	HQDA

During the week of Aug. 7, 2000, a CDG orientation will be held in the National Capital Region to familiarize new members with the CDG Program and the current Army Acquisition Workforce/Corps initiatives. Acquisition career managers will assist new members in developing and refining an individual development plan that will be used to guide the CDG member through the 3-year program.

The orientation will also present an opportunity for all members of the inaugural CDG, YG97, to be recognized at a graduation ceremony. Of the 25 members, 15 have been promoted! This ceremony will bring YG97 members together to recognize their accomplishments and to thank them for paving the way for future year groups. The enthusiasm and pioneering efforts of this inaugural group will always be a part of the spirit of the CDG and the Acquisition Corps.

Operational Experience Program

The biannual Acquisition Education, Training and Experience (AETE) Board will meet again in August 2000 to select individuals to participate in the Army Acquisition Corps (AAC) Operational Experience Program (OEP). The OEP offers a unique opportunity to obtain firsthand experience on how systems are employed in a field environment.

Currently, the National Training Center (NTC), Fort Irwin, CA, offers a 2-day OEP orientation to groups of up to 12 individuals. Participants receive command and opposing force (OPFOR) briefings, a tour of the OPFOR Operations Center, and an instrumentation demonstration. The orientation culminates with the participants witnessing the OPFOR in a field training environment.

Other available OEP assignments at the NTC include 2- to 4-month science advisor experiences in the Army Materiel Command Science Advisor's Office and "greening" opportunities in military operations for civilian workforce members. These opportunities allow individuals and small groups to participate in a variety of field training exercises that typically last 1 week.

The OEP provides the opportunity to observe the actual application of Army doctrine and use of systems in a field environment. Small-team participation in operational experiences can be a great team-building opportunity! Upon return to their home stations, participants are enriched with a renewed focus on the needs of the customer—the warfighter.

The Operational Experience Program is coordinated and funded by the AAC. Additional information on operational experience opportunities can be found in the AETE Catalog table of contents in the **Career Development** link on AAC's home page at **http://dacm.sarda.army.mil**. Scroll down to the *Experiential and Developmental Opportunities* section in the table of contents. Information on how to apply for operational opportunities is also provided at this site.

Naval Postgraduate School Update

In 1999, a pilot Naval Postgraduate School (NPS) distance learning curriculum, Master's of Science in Program Management (MSPM 836), was implemented at Edgewood Arsenal/Aberdeen Proving Ground, MD; the U.S. Army Tank-automotive and Armaments Command, Warren, MI; Fort Monmouth, NJ; and Redstone Arsenal, AL. The program focuses on management skills in an acquisition environment. Thirty-four individuals are participating in the 27-month program.

The MSPM 836 curriculum consists of 50 credit hours completed in 9 quarters. For the first eight quarters, classes are held via video teleconferencing linkup with the NPS classroom in Monterey, CA. The last quarter of the curriculum is an accelerated 8-week session in residence at NPS in Monterey. The MPSM 836 curriculum satisfies the mandatory Defense Acquisition University program management and logistics course requirements of the Defense Acquisition Workforce Improvement Act (DAWIA).

The Acquisition Career Management Office (ACMO) is currently looking to expand the number of MPSM 836 distance learning sites and to offer additional MPSM 836 training opportunities at current sites. In April, NPS and ACMO officials visited Picatinny Arsenal and Fort Monmouth, NJ, and Huntsville, AL. During these on-site visits, prospective students received a thorough briefing on the MSPM 836 curriculum. One-on-one counseling sessions were also provided to simplify the application process and answer questions of potential students regarding qualifications to apply for the MSPM 836 curriculum. ACMO personnel counseled potential students on the Acquisition Education, Training and Experience (AETE) Board process and provided detailed information on assembling application packets.

Individuals interested in more details on MSPM 836 should refer to the AETE Catalog table of contents in the **Career Development** link of the Army Acquisition Corps home page at **http://dacm.sarda.army.mil/**. Scroll down to the *Educational/Academic* section in the table of contents. Application procedures are also provided at this site.

Army Acquisition Certification

A new certification policy for Army Acquisition Workforce members is now in effect. The following procedures outline the process to request certification in a specific acquisition career field:

• Contact your acquisition career manager to update your Acquisition Career Record Brief (ACRB) or Officer Record Brief (ORB). A list of acquisition career managers may be found at **http://dacm.sarda.army.mil/contacts/careermanweb.htm**.

• Print a copy of your updated ACRB. Military officers must request a copy of their ORB through their acquisition career manager. In Section X, annotate the career field and the level of certification you are requesting. Sign and date your ACRB/ORB and send the copy to your acquisition career manager. (Civilians must also include a DA Form 2302-R, *Civilian Qualification Record*, or an assignment history.)

Your acquisition career manager will work with the certifying official to get your ACRB/ORB signed and added to the DACM database. In approximately 2 weeks from the time you submit your request, your acquisition career manager will send you the ACRB/ORB signed by the certifying official. The DACM database, as reflected by this copy of your ACRB/ORB, is the official record of certification.

For further information on certification requirements, contact your acquisition career manager.

USAR Acquisition Corps Officers Needed

Career opportunities and specialized training are now available to U.S. Army Reserve (USAR) officers interested in the development and procurement process for the Army's combat service support and combat support systems.

In December 1999, Chief of Army Reserve MG Thomas J. Plewes approved establishment of the USAR Acquisition Corps. The purpose is to provide trained and motivated USAR officers for key acquisition positions throughout the Army. Establishment of the Army Reserve Acquisition Corps emphasizes the continuing integration of the Army Reserve with the Active Army.

As part of the new USAR Acquisition Corps initiative, 53 full-time Active Guard and Reserve (AGR) positions will be established at Army agencies such as the Army Tank-automotive and Armaments Command, the Army Communications-Electronics Command, the Army Aviation and Missile Command, the U.S. Army Reserve Command, the Office of the Chief of Army Reserve, the Program Executive Office for the Standard Army Management Information System, and at other information technology (IT) commodity commands. Functional Area (FA) 51A acquisition positions will be created at commands aligned with Army Reserve core competencies. AGR contracting (FA51C) and system automation (FA51R) positions will also be established in the near future to support USAR contracting and IT needs.

Interested Army Reserve officers (captain through colonel) may be qualified for the acquisition FA. Individuals must have previous experience or currently hold civilian employment in the acquisition field, which includes program management, software development, and systems engineering positions.

Army Reserve acquisition officers are expected to gain the required experience within their full-time civilian jobs.

However, qualified Reservists will receive specialized training and unique assignments to help them develop their skills as acquisition professionals.

An added benefit for Army Reserve officers is the ability to dual track. This means individuals can pursue career opportunities in their basic branch or other FA and still be eligible for Army Acquisition Corps (AAC) training and assignments.

Because the AAC does not have battalion or brigade command equivalent positions available for Reservists who are not full-time personnel (these positions are available to AGR officers as product managers (lieutenant colonel) and project managers (colonel)), acquisition officers can continue to take opportunities to command battalions or brigades within their basic branch or FA. Successful command tours increase potential for promotion. After holding command positions, these officers may then opt to pursue assignments in the acquisition field.

The USAR currently has 173 Troop Program Unit and 472 AAC positions that will be centrally managed for schooling and level certification at the Army Reserve Personnel Command (AR-PERSCOM).

The Acquisition Personnel Management Office (APMO) has been established at AR-PERSCOM to support career management, training coordination, and certification for all Army Reserve officers. APMO is the central point of contact for all USAR Acquisition Corps personnel management issues.

Interested individuals with the required experience can learn more about the training and assignment opportunities available to AAC officers by completing the Army Acquisition Workforce/Corps-Reserve Component Data Call Packet at **http://dacm.sarda.army.mil**. Select the **News** option and scroll to the link at the bottom of the page.

You may also contact APMO at 1-800-325-4972.

*The preceding article was written by MAJ Francisco Espaillat, Chief, APMO, AR-PERSCOM. He can be contacted at **ZPA@arpstl-emh1.army.mil**.*

ACMO Welcomes New Employees

The Army Acquisition Career Management Office (ACMO) extends a welcome to new staff members Ann M. Kelsey, Timothy D. McClellan, Douglas Packard, and LTC Gerald M. Rottinghaus.

Kelsey is an Acquisition Projects Specialist with the ACMO. Her primary responsibilities include the Acquisition Education, Training and Experience (AETE) Catalog and regional acquisition education, training, and experience opportunities.

During Kelsey's 10 years of civil service, she has held positions as Chief, Independent Validation and Verification with the Office of the PM, Reserve Component Automation System, Washington, DC; and as a Computer Specialist in the Office of the PM, Strategic and Theater Command and Control System, Fort Belvoir, VA. Kelsey holds a B.A. in business administration from Saint Leo University, Saint Leo, FL. She can be

contacted at **kelseyam@sarda.army.mil**, or at (703) 604-7118 or DSN 664-7118.

McClellan is one of the Systems Planning, Research, Development and Engineering Proponents and the sole Test and Evaluation Proponent. His primary responsibilities include central position management of deputy program managers, overall proponency roles and missions, and serving as an ACMO representative to the Army Acquisition and Technology Workforce Working Group. In addition, he is a member of the ACMO's Future Planning Team.

During McClellan's 17 years of civil service, his key assignments included Acting Deputy Director for Advanced Technology Initiatives at the U.S. Army Aviation and Missile Command (AMCOM), Redstone Arsenal, AL; Rapid Force Projection Initiative Deputy Technology Program Manager at AMCOM; and Science Advisor to the Commanding General, I Corps, Fort Lewis, WA.

A member of the Army Acquisition Corps (AAC), McClellan holds a B.S. in business management from Jacksonville State University, Jacksonville, AL; a B.S. in civil engineering from Auburn University, Auburn, AL; and an M.A. in management from Webster University, St. Louis, MO. McClellan can be contacted at **McClellT@sarda.army.mil**, or at (703) 604-7112 or DSN 644-7112.

Packard is the new ACMO Contracting Proponent. His primary responsibility is to manage the AAC Competitive Development Group (CDG) Program and the Operational Experience, Training With Industry, and Naval Postgraduate School Programs.

Packard has more than 11 years of civil service experience in the Army Acquisition Workforce and has held positions as Contract Specialist, Contracting Officer, and Procurement Analyst with the Army Training and Doctrine Command and the Military Traffic Management Command. He was selected for the CDG, Year Group 98, where he served as an Acquisition Management Specialist and Contingency Contracting Officer with the U.S. Army Contracting Command Europe.

A member of the AAC, Packard holds an M.B.A. from the Florida Institute of Technology and a B.S. in business administration from Christopher Newport College. He has also completed the Army Management Staff College and the Advanced Program Management course. Packard can be contacted at **packardd@sarda.army.mil**, or at (703) 604-7105 or DSN 664-7105.

Rottinghaus is the most recent National Guard Bureau (NGB) Acquisition Proponency Officer assigned to the ACMO. His primary responsibilities are to serve as the Army National Guard (ARNG) Acquisition Workforce point of contact, represent the ARNG on policy matters, and ensure policies are distributed to the ARNG acquisition career staff.

Throughout his more than 30 years of military service with the Kansas National Guard, Rottinghaus served in a number of key positions such as Contracting Officer for the U.S. Property and Fiscal Office Topeka, KS; and Contracting Officer and Associate Director, Small and Disadvantaged Business

Utilization, HQ NGB, Washington, DC. His most recent assignment was in the Office of the NGB Acquisition Policy Directorate.

A member of the AAC, Rottinghaus holds a B.S. in business and an M.S. in counseling from Emporia State University, Emporia, KS. He can be contacted at **RottingG@sarda.army.mil**, or at (703) 604-7122 or DSN 664-7122.

PERSCOM Notes . . .
Officer Distribution Plan

The Officer Distribution Plan (ODP) is a tool that the U.S. Total Army Personnel Command (PERSCOM) uses to provide major commands their fair share of available officers. First, the major commands identify how their share is distributed among their subordinate commands and provide that information to PERSCOM. The final ODP allocation is PERSCOM's promise to the commands to provide them the stated number of officers by the end of the fiscal year. Occasionally, adjustments are made to the ODP during the year (e.g., changes in priority of fill, more or less available officers than originally projected).

Additionally, the Army Acquisition Corps must apply the ODP allocation to the Military Acquisition Position List (MAPL). Basically, for a command to have a valid requirement for an officer, it must have an identified MAPL position and fewer officers currently assigned (or projected) than its allocated ODP. An adequate quantity of officers is not available to fill all MAPL positions; therefore, the ODP is used to allocate officers in accordance with the Army leadership's priorities.

The ODP affects individual officers because it limits where they can go. Officers cannot go to commands that do not have ODP-supported MAPL positions. Simply put, a vacant MAPL position does not mean an officer can be assigned to that position. Only if the command has determined that the MAPL position is ODP-supported will it be filled. Additionally, officers cannot go to positions already filled by another officer.

The ODP also affects commands because they must decide which positions to support with the ODP. In most cases, commands will have some MAPL positions remain vacant. Commands are encouraged to provide prioritized listings to PERSCOM so that positions are filled based on the major commands' fill priority. Commands can expect to have no overlap between inbound and outbound officers. In fact, commands may have a gap between officers of 1 to 3 months.

The FY01 ODP process will begin soon. Commands should take a hard look at their positions and create a prioritized list to assist with the ODP distribution process. PERSCOM's Acquisition Management Branch wants to ensure that the fill of the MAPL is aligned with the commands' priorities.

Acquisition Management Branch Reorganizes

Effective June 1, 2000, the U.S. Total Army Personnel Command Acquisition Management Branch (AMB) will be reorganized to better serve the military acquisition community. The reorganization aligns AMB with the Officer Personnel Management System for the 21st Century (OPMS XXI), changes reflected in DA Pamphlet 600-3, *Commissioned Officer Development and Career Management*, and the *Army Acquisition Corps/Workforce Playbook 2000*. The AMB changes reinforce the Acquisition Career Development Model and the Acquisition Corps certification process.

The Acquisition Career Development Model, as described in the playbook, has three progressive levels that form the basic career path an officer follows in developing functional and leadership competencies. AMB will manage officers' careers through three levels (see accompanying diagram).

The first level, "Functional Expertise," allows an officer to gain expertise in a single acquisition career field (Level III certification) and to meet Army Acquisition Corps (AAC) membership requirements. Officers at this level are majors and captains in year groups (YGs) 88-93 who are generally seeking their first or second AAC assignment. Two assignment officers are responsible for these officers, one for YGs 88 and 89 and the other for YGs 90-93. Dividing the officers this way allows an AMB assignment officer to manage a population that has similar career development needs.

The second level of the Acquisition Career Development Model, "Broadening Experience," allows an officer to build cross-functional and leadership
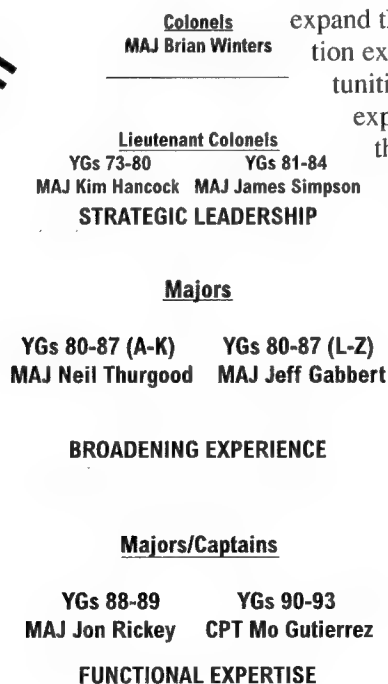
competencies through education, training, and experience. This level targets YG 80-87 majors on their second and subsequent AAC assignments. These officers should be seeking positions that broaden their acquisition experience and prepare them for critical acquisition positions (CAPs). Again, two assignment officers will manage this population. However, instead of dividing the officers by YG, the population is divided by the first letter of their last name. One assignment officer will manage A-K and the other will manage L-Z.

The third level of the Acquisition Career Development Model, "Strategic Leadership," which is considered the CAP level, allows an officer to apply acquired leadership and functional competencies in key leadership positions. All colonels and lieutenant colonels are at this level. These officers are divided into three groups: colonels, lieutenant colonels YGs 73-80, and lieutenant colonels YGs 81-84. Again, dividing the officers in this manner allows an AMB assignment officer to manage a population that has similar career development needs.

Officers with multifunctional backgrounds are best qualified to fill CAPs and serve as product and project managers and acquisition commanders. During the functional expertise and broadening experience years, officers should pursue certification in at least two acquisition career fields (ACFs). Acquisition certification requires a combination of education, training, and experience. AMB's reorganization will expand the scope of assignment opportunities and acquisition experience available to officers. Assignment opportunities in multiple ACFs will provide officers with the experience needed for certification and encourage the development of multifunctional officers.

The accompanying diagram identifies the AMB assignment officers and the acquisition officers they manage at each level. As you can see, the reorganization coincides with the arrival of several new officers at AMB. Current phone numbers and e-mail addresses for Acquisition Corps assignment officers are on the AMB home page at **http://www-perscom.army.mil/ OPfam51/ amb-staff .htm**.

AMB Reorganization

Colonels
MAJ Brian Winters

Lieutenant Colonels
YGs 73-80	YGs 81-84
MAJ Kim Hancock	MAJ James Simpson

STRATEGIC LEADERSHIP

Majors
YGs 80-87 (A-K)	YGs 80-87 (L-Z)
MAJ Neil Thurgood	MAJ Jeff Gabbert

BROADENING EXPERIENCE

Majors/Captains
YGs 88-89	YGs 90-93
MAJ Jon Rickey	CPT Mo Gutierrez

FUNCTIONAL EXPERTISE

DEVELOPMENT MODEL

FY00 Experimental Test Pilot Board

One of the responsibilities of the U.S. Total Army Personnel Command (PERSCOM) Acquisition Management Branch (AMB) is to manage the Army's Experimental Test Pilot (XP) Program. This program is used to train selected Active duty Army aviators to become qualified experimental test pilots.

The FY00 XP Board convened Feb. 14-15, 2000, and selected the following individuals as the best qualified commissioned and warrant officers for the program:

MAJ John J. Jones	CPT David S. Wolons
MAJ Robert S. Kimbrough	CW3 Damon E. Bostick
CPT John O. Nugent	CW3 Gregg A. Deetman
CPT Scott J. Rauer	CW3 Gregory M. Lausin
CPT Kevin D. Williams	

Commissioned officers selected for the program are automatically awarded Functional Area (FA) 51 and are integrated into the Army Acquisition Corps. Warrant officers selected for the program continue to be managed by the Warrant Officer Division at PERSCOM. All selectees will attend an 11-month test pilot program at the U.S. Naval Test Pilot School (USNTPS), Patuxent River, MD. These officers may also be required to spend 12 to 18 months at a civilian educational institution pursuing an aeronautical engineering degree prior to entering USNTPS.

After successfully completing USNTPS, test pilots are assigned to an initial tour as an experimental test pilot. Further assignments are in consonance with the officer's designated FA and the needs of the Army. Use of officers in research, development, and acquisition positions may be as experimental test pilots or in positions affecting the type, design, and configuration of Army aircraft. Because of the Army's high-dollar investment in honing the experience and skills of experimental test pilots, their use and professional development is closely monitored by AMB.

Application packets from officers who desired to compete before the FY00 Test Pilot Board were screened by AMB to ensure that qualification criteria were met. Applications that failed to meet the criteria were returned to the officers with a letter addressing their lack of qualifications. The letter also included a recommendation to reapply after the minimum requirements are met.

Examples of minimum qualifications are 700 required flight hours for commissioned officers, 1,000 for warrant officers; 12 months time on station at the time the board convenes; and completing, with above-average grades, educational degree programs that include college algebra, calculus, differential equations, and physics (or mechanics). Commissioned officers are required to have a baccalaureate degree in an engineering or other hard-science program, and warrant officers must have an associate's degree.

In reviewing XP Program applications, board members placed a great deal of emphasis on academic degrees, instructor pilot/senior instructor pilot (IP/SIP) recommendations, flight hours, and officers with pilot-in-command hours. Additionally, board members relied heavily on IP/SIP comments regarding an officer's flying ability. An applicant's chances for selection were enhanced if current IP/SIP recommendations clearly addressed an officer's flying ability and potential.

The next XP Board is tentatively scheduled for February 2001. Interested applicants should review the MILPER message announcing the FY01 XP Board (to be released in September 2000) to verify that they meet the minimum requirements. Commissioned officers interested in applying should contact CPT Jon K. Rickey at (703) 325-2800 or DSN 221-2800, or by e-mail at **rickeyj@hoffman.army.mil**. Warrant Officers should contact CW3 Carlton Jenkins at (703) 325-5251 or DSN 221-5251, or by e-mail at **jenkinsc@hoffman.army.mil**.

IMPORTANT NOTICE

If you are an individual who receives *Army AL&T* magazine and you have changed your mailing address, do not contact the *Army AL&T* Editorial Office! **We cannot make address changes regarding distribution of the magazine.** Please note the following procedures if you need to change your mailing address:

• Civilian members of the Army Acquisition Workforce must submit address changes to their Civilian Personnel Advisory Center (CPAC).

• Active duty military personnel must submit address changes to their Military Personnel Office (MILPO).

• Army Reserve personnel must submit address changes to the U.S. Army Reserve Personnel Command (AR-PERSCOM) in St. Louis, MO.

• National Guard personnel must submit address changes to the Army National Guard Acquisition Career Management Branch at **perkindc@ngb-arng.ngb.army.mil** or call DSN 327-7481 or (703) 607-7481.

Your attention to these procedures will ensure timely mailing of your magazine.

Arming the Eagle: A History of U.S. Weapons Acquisition Since 1775

By Wilbur D. Jones Jr.
Defense Systems Management
College Press, 1999

Reviewed by A. Joseph Stribling, Contract Support, Army AL&T magazine.

The history of weapons acquisition is the history of the conflicts among the military, Congress, and industry, and offers hard-won lessons for procurement professionals and laypersons alike. *Arming the Eagle* describes how American military acquisition attitudes evolved from apprehension and outright hostility toward new technologies to a preoccupation with the latest and greatest. This 531-page volume could have easily been subtitled "From Flintlocks to Fire-and-Forget," as it covers how the acquisition community responded to a vast array of emerging technologies, some more valuable than others.

Documenting more than 200 years of military acquisition history, *Arming the Eagle* serves up everything from atomic bombs to zinc, with plenty of howitzers and K-rations in between. Because none of these technologies were created in a vacuum, the author describes their development within the context of the political, economic, and international circumstances that gave rise to them. The acquisition process is examined in relation to such key historical transitions as the Nation's movement from an agrarian to industrial society, the growth of American sea power, and the rise of the military industrial complex.

The author's writing style is lucid and remarkably free of unwieldy syntax. The jargon usually associated with government publications is noticeably absent. The occasionally arcane military terminology is explained in layman's terms. Clear and easy-to-read charts and diagrams highlight key issues, dates, and events. Familiar (and not so familiar) buzzwords like "flexible response," "projectizing," and "Fordism" document the Services' continuing challenge of adapting to a perpetually shifting acquisition environment. The description of the DOD fruitcake specifications is worth the price of admission alone, providing a welcome example of the necessity for realistic commercial procurement practices.

The concluding chapter offers a brief primer on various military systems (PATRIOT missile, mine countermeasures vessels, etc.) and their capabilities and shortcomings. The book also chronicles the rise and fall of the Joint Strike Fighter and Sergeant York Division Air Defense Program and how procurement and political issues played a role in their respective demise. A brief summary is provided at the end of each chapter.

Arming the Eagle should appeal to both the student of history as well as the industry and military professional. While the absence of an index may limit its usability as a research tool, academicians would do well to refer to its thorough and painstaking annotations. For the casual reader, *Arming the Eagle* is a fascinating study of the intersection of the Services' needs and industry's attempts to meet them. As a primer for those in the acquisition community, *Arming the Eagle* chronicles how the mistakes of the past can help those in the present build an enduring military for the future.

Project Manager's Portable Handbook

By David I. Cleland and Lewis R. Ireland, McGraw-Hill, 2000

Reviewed by LTC Kenneth H. Rose (USA, Ret.), Tidewater-Richmond Area Manager for WPI in Hampton, VA, and a former member of the Army Acquisition Corps.

Anyone who recently purchased a project management handbook probably needed a shopping cart to convey it to the checkout line. What the world needs now is the literary equivalent of a laptop computer—a handbook that is small, durable, powerful, and complete. David I. Cleland and Lewis R. Ireland have delivered just such an item with their new *Project Manager's Portable Handbook*.

Published by McGraw-Hill as part of their portable handbook series, the book is designed for use, not reverence. Its 5.5-by 8.5-inch format makes it easily transportable. Its durable soft cover, quality paper stock, and sewn binding will survive the briefcase or backpack.

Its principal value, of course, lies in its content. Its "bullet" presentation allows quick scanning and easy assimilation. Throughout, the text follows a five-step framework that provides form and consistency. Each section begins with an introduction that describes the following information and tells why it is important. The content is arranged in logical subsections and disclosed through summaries, figures, and tables.

Each subsection ends with key user questions, a summary, and an annotated bibliography. The questions are not a quiz, but rather thought-provoking inquiries that challenge readers to apply the content to their own real-world experiences. Summaries are always brief, not repetitive regurgitations of all that has gone before. The annotated bibliographies provide useful pointers to sources of more extensive information, often giving specific chapter and page references.

Cleland and Ireland's comprehensive approach begins with the basics of project management principles and processes and

extends through organization design, alternative applications, and the strategic context of projects within an enterprise. They include an often-overlooked aspect of project management, the role of the board of directors.

The section on alternative project applications includes two brief gems: the management of small projects, which offers a roadmap for low-cost, short-duration activities; and managing change through project management, which shows how project management techniques provide a vehicle for navigating this often-treacherous terrain.

The section on project leadership includes an insightful subsection on coaching, making clear that leadership responsibilities go far beyond giving orders and writing appraisals.

In addressing project initiation and execution, Cleland and Ireland cover various topics, such as project selection, legal considerations, proposal writing, contract negotiations, and even Deming's 14 points. All of this sets the stage for the centerpiece section on project planning and control.

At 80 pages, the planning and control section is the longest in the book. Rightfully so, for these subjects are the essence of project management. The work breakdown structure is intro-

duced early as an essential mechanism. Later in the section, after other contributing elements have been made clear, it receives additional, more detailed treatment. Planning and scheduling follow, leading to monitoring, evaluation, and control. The authors link in risk management related to cost, schedule, and technical performance. Decisionmaking, budgets, and formal project management systems round out this central section that could almost be extracted as a stand-alone, hip-pocket guide.

The book includes "people" issues such as culture and communications, addressing the important aspects of team development, motivation, effective meetings, conflict, and negotiation. It closes with a frank discussion of improvement opportunities that range from leadership philosophy to rescuing projects in trouble.

The *Project Manager's Portable Handbook* is a unique and invaluable resource for project management professionals. Its direct, summarized style makes a wealth of information readily available, and its annotated bibliography extends the reader's reach directly to additional sources. This is one book a project manager should not be without.

Dear Editor,

I was reading in your latest issue [January-February 2000, Page 20] the announcement of some 87 Army recipients of R&D awards. What astounded me was that I could only recognize one female recipient. Even if I missed one or two, the number of females is very, very small. Out of so many awards given, one would think there would at least be a fair amount of female recipients. Unfortunately, this event sends a very bad message to others that I am not sure is intended.

Could you please pass this to whoever is involved in the awards selection process? Something just does not add up. I am not saying the distribution should be 50-50, but I do admit I am feeling a wee bit embarrassed.

Thank you for your time.

Sincerely,
Joseph A. Ricci
Department of Army Civilian
Technical Advisor to Public Affairs for
Installation Support
U.S. Army Environmental Center
410-436-1271

Response From Army AL&T:

Thank you for your letter. It has been forwarded to the author of the article.

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• National Guard personnel must submit address changes to the Army National Guard Acquisition Career Management Branch at **perkindc@ngb-arng.ngb.army.mil** or call DSN 327-7481 or (703) 607-7481.

Your attention to these procedures will ensure timely mailing of your magazine.

Army Recognizes Outstanding R&D Organizations

Since 1975, the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASAALT) has presented annual Research and Development Organization (RDO) of the Year Awards to Army organizations in recognition of outstanding technical and managerial programs executed during the previous fiscal year. Specifically, RDO Awards recognize the best research and development (R&D) programs and best-managed laboratories that enhance the capability and readiness of Army operational forces and the national defense and welfare of the United States. At an awards ceremony held in his office Oct. 22, 1999, ASAALT Paul J. Hoeper presented the annual awards to the selected organizations for achievements during FY98.

RDO Award recipients were selected by an Evaluation Committee chaired by the Director for Research and Laboratory Management and composed of highly qualified members of the Army's and DOD's science and technology community. The committee evaluated both written nominations submitted through each organization's major command and verbal presentations from each organization's commander or director. The organizations' rankings were based on their organizational accomplishments and impact; vision, strategy, and plan; resource allocation; and continuous improvement.

Based on the review of accomplishments, the Evaluation Committee selected two RDO of the Year Award recipients, one in the Small (less than 600 employees) and one in the Large (more than 600 employees) Laboratory Category.

Additionally, the Evaluation Committee selected two organizations (one small and one large laboratory) for Army RDO Excellence Awards in recognition of their FY98 research accomplishments.

Army RDO Of The Year Award— Small Laboratory Category

The winner selected in the *RDO of the Year Award—Small Laboratory Category* was the U.S. Army Corps of Engineers (COE) Topographic Engineering Center (TEC). TEC's mission is to provide the warfighter with a superior knowledge of the battlefield and support the Nation's civil and environmental initiatives through research, development, and application of expertise in the topographic and related sciences.

During FY98, TEC initiated three Army Science and Technology Objectives: Rapid Mapping Technology, Three-Dimensional Dynamic Multispectral Synthetic Scene Visualization, and Advanced Geospatial Management for Information Integration and Dissemination. TEC also supported three Advanced Concept Technology Demonstrations: Rapid Terrain Visualization, Theater Precision Strike Operations, and Synthetic Theater of War.

TEC's major technical accomplishment during FY98 was research into active and passive fluorescence for military remote sensing and environmental monitoring. This technology proved useful in detecting terrestrial and marine petroleum spills, unexploded ordinance/high-explosive residue, and radiation contamination. Bench-top measurements using spectrofluorometers capable of obtaining 3-D excitation-emission matrices in the ultraviolet, visible, and near-infrared spectral regions were used to establish basic relationships between fluorescence response and feature attribution. Recently, this technology was demonstrated during a mine detection experiment in which all targets were identified.

TEC also actively participated in the Division XXI Advanced Warfighting Experiment (DAWE), fielding the Digital Topographic Support System-Heavy (DTSS-H) to the Army's 4th Infantry Division, the First Digitized Division. As part of DAWE, TEC provided technical and operational support to the DTSS-H. The DTSS-H demonstrated the value of extended topographic support in achieving a common view of the battlefield. Subsequently, the DTSS Program's production requirements have tripled, and program funding has significantly increased.

Another significant accomplishment of TEC was the Global Positioning System (GPS) Tides Project, which established a new tidal datum for the Saint Mary's Entrance Channel in Florida. This is believed to be the first time that a GPS was used to model and obtain real-time tide information without accessing tide gauges. Ultimately, the COE Jacksonville District formally replaced the existing automated tide data system with the GPS Tides System designed by TEC because it provided more accurate and less expensive data.

Army RDO Of The Year Award— Large Laboratory Category

The winner selected in the *RDO of the Year Award—Large Laboratory Category* was the U.S. Army's Tank-automotive and Armaments Command's Armament Research, Development and Engineering Center (TACOM-ARDEC). TACOM-ARDEC was also the 1998 (FY97 achievements) Army Excellence Award recipient for Large Laboratories and is considered the Army's leader in generating and transitioning combat firepower.

TACOM-ARDEC's major technical accomplishment was R&D in support of Crusader, the U.S. Army's next generation self-propelled howitzer and supply vehicle. Accomplishments related to Crusader included XM297 cannon integral midwall cooling, breech actuation, and laser ignition. Also cited was TACOM-ARDEC's work on the Crusader gun mount, modular artillery charge system, and multioption fuze for artillery. Eight patents were received and one more is pending.

TACOM-ARDEC recently received the prestigious New Jersey's Quality Achievement Award, becoming the first federal government organization to win this state award.

Army RDO Award for Excellence— Small Laboratory Category

The recipient of the *RDO Award for Excellence—Small Laboratory Category* was the U.S. Army Medical Research Institute of Chemical Defense (USAMRICD). USAMRICD is the Nation's lead laboratory for the development of medical countermeasures to chemical warfare agents and for training medical personnel in the medical management of chemical casualties.

During FY98, the institute met numerous assigned objectives. One was obtaining Food and Drug Administration approval for the Field Cholinesterase Test Kit. Other accomplishments include transitioning of an advanced anticonvulsant and a methemoglobin monitor, supporting development of a topical skin protectant for both

Shown left to right are Dr. A. Michael Andrews, Deputy ASAALT; Dr. William Roper, COE TEC; COL James Romano, USAMRICD; Michael Fisette, TACOM-ARDEC; Dr. Robert Whalin, ARL; Paul J. Hoeper, ASAALT.

vesicant and nerve agents, and demonstrating the efficacy of bioscavengers against nerve agent intoxication. Several products have also been fielded by USAMRICD, including the nerve agent pretreatment Pyridostigmine, necessary to provide protection against soman, and the M291 Skin Decontamination Kit.

USAMRICD was also recognized for efforts related to development of medical countermeasures for sulfur mustard. Six strategies were identified for pharmacological intervention—DNA alkylation, DNA strand breaks, poly (ADP-ribose) polymerase (PARP) activation, disruption of calcium homeostasis, proteolytic activation, and inflammation. Furthermore, USAMRICD developed *in vivo* and *in vitro* techniques to evaluate pharmacological countermeasures for each of the above mechanisms. Using these techniques, researchers screened drugs active against each mechanism to identify candidate medical countermeasures to vesicant agents.

Another area in which USAMRICD excelled was in training efforts related to the medical management of chemical casualties and support to U.S. agencies that oversee counterterrorism preparedness.

Army RDO Award For Excellence— Large Laboratory Category

The recipient of the *RDO Award for Excellence—Large Laboratory Category* was the U.S. Army Research Laboratory (ARL). ARL executes fundamental and applied research to provide the Army with the key technologies and the analytical support to ensure supremacy in future land warfare. Its research programs provide the technological underpinnings for systems under development throughout the Army and for new products for the Army After Next (AAN).

ARL's major technology accomplishment was advancements in meeting the survivability and lethality challenge for the AAN. ARL's work laid the foundation for a lighter and more lethal combat vehicle. Of special significance was work on emerging passive armor technology, kinetic energy active protection, and the application of high-performance computing techniques for faster and more efficient development of armor/anti-armor technologies.

In addition, several other programs were transitioned from ARL to the Army's research, development, and engineering centers and other customers. These included Ferro-electric Phase Shifters, Protocol Specifications for Digital Communications on the Battlefield, Performance Based Metrics for the Digitized Battlefield, and Inertial Reticle Technology.

During 1998, ARL continued to be widely recognized for innovations in R&D management. In particular, four of Vice President Al Gore's Hammer Awards were presented to ARL for the Alternative Personnel Demonstration System, the Federated Laboratory concept of operations, turbine engine diagnostics, and DOD's Small Business Innovative Research Program reform. The highly successful Federated Lab concept has drawn national attention as a novel way for the Army to partner with the private sector to jointly develop technologies critical to the future Army.

The preceding article was written by Michael Zoltoski while he was on assignment in the Office of the Deputy Assistant Secretary of the Army for Research and Technology.

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Your attention to these procedures will ensure timely mailing of your magazine.

FROM THE ACQUISITION REFORM OFFICE...

ITAS Multiyear Contract Conversion

The Tube-launched, Optically-tracked, Wire-guided Improved Target Acquisition System (ITAS) annual contract was converted to a 4-year procurement on Dec. 27, 1999. The FY99 annual contract contained a provision that allowed the government to convert to a multiyear contract in FY00. The conversion to a multiyear procurement requires no economic order quantity investment and has a cancellation ceiling of zero. In addition, conversion of the annual contract saves the government approximately $3.8 million for 10 ITASs provided at no additional cost. This is broken out as five ITASs for execution of the multiyear procurement and five additional ITASs for execution of the last year of the multiyear procurement.

For more information, contact LTC Edmund Dowling, Product Manager, Advanced Target Acquisition Systems, Close Combat Anti-Armor Weapons System Project Office, Redstone Arsenal, AL, (256) 876-4800.

Exchange/Sales Authority Used For Army Watercraft Programs

The U.S. Army Tank-automotive and Armaments Command's (TACOM's) Deployment/Support Equipment Commodity Business Unit and the Army Watercraft Systems Product Manager (PM), in partnership with Modern Technologies Corp. and the Defense Reutilization and Marketing Service, have successfully implemented the sales provisions of the recently revised exchange and sale authority. This authority enables the Army to sell nonexcess equipment resulting from a modernization program and use the sale proceeds to fund the cost of replacement equipment. This program is being managed under the provisions of the *Federal Property Management Regulation*, 41 CFR 101-46, and the *DoD Materiel Management Regulation*, DoD 4140.1-R.

Under a pilot program, inflatable three-man reconnaissance boats were sold to test the process. After the process was in place, TACOM sold 20 vessels at Fort Eustis, VA, for more than $1.8 million and will use the funds to augment underfunded replacement equipment.

The points of contact for this article are Michael McGee, Deputy PM, Watercraft, and Suzanne Holbrook, Chief, Troop Support Group, (810) 574-6491.

Acquisition And Logistics Reform Week Announced

On Jan. 24, 2000, Under Secretary of Defense for Acquisition, Technology and Logistics Dr. Jaques S. Gansler signed a memorandum designating May 22-26, 2000, Acquisition and Logistics Reform Week. The contents of that memorandum follow.

For the past four years, we have highlighted acquisition reform initiatives through special activities during Acquisition Reform Week. Last year, we combined acquisition and logistics reform and had a very successful event. To build on this success, I have designated May 22-26, 2000 for our next Acquisition and Logistics Reform Week. The theme for the week will be: "Embracing Change for the 21st Century Warfighter."

Sometime during this week, I would like each organization to cease their normal operations for one day and focus on acquisition and logistics reform in order to share implementation successes and determine what can be done to continue the reform. Commanders and managers at all levels will be responsible for planning and conducting their own activities for the day. To that end, we will not dictate the day's agenda. Each organization will design their own activities consistent with their needs. These activities may include, for example, case studies, discussions of lessons learned, panels, speeches, classes and simulations.

To support you, the Defense Acquisition University's Acquisition Reform Communications Center (ARCC) will be providing a package of training materials. Organizations may use these materials to supplement or add focus to their own training programs both during Acquisition and Logistics Reform Week and throughout the remainder of the year. This package, together with our satellite broadcasts and other Service/Agency-hosted training events, support our continuing education policy of 80 hours every two years.

We are experiencing many successes in acquisition and logistics reform, but much can still be accomplished. Acquisition and Logistics Reform Week will enable us to further embrace the revolution in business affairs, and take the next step in providing better, faster and less expensive products to our customers.

For additional information on this announcement, contact Bruce Waldschmidt at DSN 664-7160.

Contractor Performance Incentives

On Jan. 14, 2000, Paul J. Hoeper, Assistant Secretary of the Army for Acquisition, Logistics and Technology, signed a memorandum on contractor performance incentives. The content of that memo follows.

Over the past year, the Deputy Assistant Secretary of the Army (Procurement) has been examining how the Army constructs its business relationships with existing and potential contractors. Understanding the procurement business case and crafting an effective contractual incentive strategy with our contractors can reduce total cost ownership for weapon systems and equipment.

The results of this study are [posted at] **http://acqnet.sarda.army.mil/library/study/study.htm**. *I am distributing the study to every contracting and program office to center attention on constructing successful business relations that improve the quality of the products/services provided to the user. An Integrated Product Team (IPT) has been chartered to develop an Incentive User Guide based on this study. This Guide will assist the acquisition workforce in applying contractual incentives more effectively. The Guide is scheduled for release in May 2000.*

In the meantime, I urge you, in partnership with your contractors, to jointly focus on understanding the business case associated with each procurement. Utilize market surveys to determine what factors will motivate contractors and experiment with innovative business strategies that emphasize your desired outcomes.

The points of contact for this action are Tom Colangelo, (703) 681-7558, DSN 761-7558, **colanget@sarda.army.mil**; and Kimberly Ritacco, (703) 681-1031, DSN 761-1031, **ritaccok@sarda.army.mil**.

NEWS BRIEFS

Pill Monitoring System May Help Soldiers

Using an ingestible pill and a receiver, research physiologists at the U.S. Army Research Institute of Environmental Medicine (USARIEM) are measuring core body temperatures in studies aimed at protecting Service members from heat and cold stress.

According to Dr. Reed Hoyt, a Research Physiologist in the Thermal and Mountain Medicine Division of USARIEM, the body temperature pill system was initially available in the 1960s and is an accurate, reliable, and comfortable alternative to rectal and esophageal monitoring systems. USARIEM, which reports to the U.S. Army Medical Research and Materiel Command (MRMC), is located at the U.S. Army Soldier Systems Center in Natick, MA.

Wrapped in a white medical-grade, silicone-based coating and measuring less than 1-inch long by ½-inch wide, the Food and Drug Administration-certified core body temperature pill looks like a fat capsule. It's composed of a battery, an antenna, and crystal embedded in medical-grade epoxy.

Test subjects swallow the pill, where it remains in the stomach for about 4 hours before entering the intestine. The pill transmits an ultra-low powered signal to a receiver, which is about the size of a thick pack of cigarettes, carried on the test subject's belt. The receiver converts a subtle change in frequency into a temperature reading, which is continuously recorded and stored in the unit for wireless or computer plug-in retrieval and analysis. HTI Technologies, Inc., Palmetto, FL, manufactures the pill, and FitSense Technology in Wellesley, MA, builds the receiver.

"The pill just passes through you like roughage in about 2 days and has been used extensively without adverse effects," said Hoyt. He notes that each pill costs $40 and is not reused.

NASA funded the first development work, which was performed at Johns Hopkins Applied Physics Laboratory. The development of the core body temperature monitoring system at USARIEM was funded with the assistance of the Defense Advanced Research Projects Agency and MRMC. Studies with

the pill are part of MRMC's ongoing Warfighter Physiological Status Monitoring Program.

Monitoring the safety of soldiers, Marines, or even firefighters—who all operate under thermally stressful conditions—is the primary use for the temperature pill.

Some of the studies in which researchers have used the temperature pill include validating the immersion limits safety table used by the U.S. Army Ranger Training Brigade, assessing the risk of hypothermia during Marine Corps recruit basic training, and determining the rate of cooling during sleep for Marines in a cold-weather environment.

During his 1998 space shuttle mission, former Sen. John Glenn used the temperature pill and USARIEM-developed receiver to participate in research studies on sleep, aging, and space travel on the body. The temperature pill showed that astronauts overheat during re-entry, which may lead to an improved space suit design, said Hoyt.

External Fuel Tank Survives Crash

The Aviation Applied Technology Directorate (AATD), Fort Eustis, VA, recently conducted a successful UH-60A BLACK HAWK full-scale drop test with external fuel tanks at the Full-Scale Dynamics Research Facility, NASA Langley Research Center, Hampton, VA. The test was conducted as part of an ongoing cooperative research and development agreement between AATD and Robertson Aviation to develop a crashworthy, ballistic-tolerant external fuel tank. The object of the test was to demonstrate that the tanks, filled with 200 gallons of water and mounted on a crash-damaged UH-60A fuselage, could survive a 65-feet-per-second crash without leaking. There was severe damage to the outer shells of the tanks, but there were no leaks. The AH-64 Apache uses a similar configuration on its weapons pylons by substituting the tanks for HELLFIRE missiles to extend its ferry range. The tanks are also proposed for use on the Army's new RAH-66 Comanche helicopter.

Thermoelectric Fan Saves Fuel, Warms Soldiers

Heaters in uninsulated structures, such as tents or barracks, have the inherent problem of unbalanced warmth since heat rises. A thermoelectric fan, developed and tested by the U.S. Army Soldier Systems Center in Natick, MA, has solved this problem.

The Army has a unique requirement to run equipment without electricity. Instead of using an outside electric power source, the fan converts a small amount of a heater's energy into electricity through a thermoelectric module, which turns the fan blades.

Army space heaters are capable of operating with many types of liquid or solid fuels, such as diesel, jet fuel, wood, or coal. The fan was designed for use with all four types of space heaters in the Army's family of space heaters. Additionally, the fan can operate on any flat surface heater with a surface temperature ranging from 500 to 700 F.

Goals of the Army's family of space heaters are to replace World War II heaters, overcome safety hazards, distribute heat better, and meet the requirements of new tents and materials developed since the 1940s and 1950s. The thermoelectric fan fits into the space heater family by efficiently using the heater's warmth.

Besides raising the living conditions in the tent, the fan has proven in tests its ability to cut fuel bills by as much as 50 percent. This is because better heat distribution puts the heat where it is needed and decreases fuel use. Tests have also shown that in severe cold-weather locations, $450 could be saved each season in a 10-man Arctic tent and $2,800 could be saved in a general-purpose medium tent equipped with two heaters and two thermoelectric fans.

Joe MacKoul, a Project Engineer at the U.S. Army Soldier Systems Center in Natick, MA, said fuel savings from one heating season could pay for the fan, which currently costs $600 but should sell for $450 when production increases.

Fielding began in March 1999 with the free distribution of 90 fans to Army units in cold-weather locations. The U.S. Army Soldier Systems Center is currently initializing a purchase of about 400 fans for inventory.

Natick Scientists Arm Soldiers With Nutrition

Scientists in DOD's Combat Feeding Program are working to ensure that the future soldier has plenty of nourishment within arm's length. Although the product is still planted in the conceptual phase, scientists are working on a nutrition patch called the Transdermal Nutrient Delivery System (TDNDS) that would be used by warfighters under extreme circumstances.

The system would conceivably expand on the osmotic technology of the nicotine patch that is worn on the arm. However, instead of transmitting nicotine, this patch will transmit vitamins and nutrients needed by the human body. Ultimately, the patch would keep warfighters at optimum performance for a day or two until they have access to a "real" meal and the time to eat it.

Gerald Darsch, Joint Project Director for the DOD Combat Feeding Program, which is part of the U.S. Army Soldier Systems Center in Natick, MA, said, "TDNDS would be used during periods of high-intensity conflict. It is not intended to ever replace a turkey dinner with all the fixings."

Darsch explained that the patch's ingredients could also include nutraceuticals. These are chemicals that could tell a hungry soldier's brain that his stomach is full or reduce combat-related stress, such as muscle fatigue and physical problems associated with prolonged cold-weather exposure and high altitude.

In the future, the patch could possibly transmit nutrients in one of several ways. According to Darsch, a microchip processor would interact with sensors to determine a warfighter's metabolic requirements. The microchip processor would then activate a microelectrical mechanical system to transmit the micronutrients. Nutrients would be transported via skin pores that have been opened by electrical impulses, or through microdialysis, which would pump nutrients directly into blood capillaries. Another potential vehicle for transport could involve controlled release of encapsulated nutrients through the skin.

Dr. C. Patrick Dunne, also involved with the DOD Combat Feeding Program, said that the patch has civilian, as well as military, applications. The patch could be used by workers in a variety of stressful, hazardous work environments. For example, the patch could potentially be used by miners, oil rig workers, firefighters, chemical production or cleanup workers, as well as by astronauts involved in spacewalks or space station repair.

Pending significant technological breakthroughs, Darsch estimates that the system could be available to military personnel around the year 2025.

Correction

In the article titled "PEO, GCSS: Responsiveness In Acquisition" that begins on Page 20 in the March-April 2000 issue of *Army AL&T* magazine, references to the Family of Interim Armored Vehicles (FIAV) should have read Family of Medium Tactical Vehicles (FMTV). We apologize for this error and any inconvenience caused to our readership.

ARMY AL&T WRITER'S GUIDELINES
http://dacm.sarda.army.mil/publications/rda/

Army AL&T is a bimonthly professional development magazine published by the Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology). The address for the Editorial Office is DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. Phone numbers and e-mail addresses for the editorial staff are as follows:

Harvey L. Bleicher, Editor-in-Chief	bleicheh@aaesa.belvoir.army.mil	(703)805-1035/DSN 655-1035
Debbie Fischer, Executive Editor	fischerd@aaesa.belvoir.army.mil	(703)805-1038/DSN 655-1038
Cynthia Hermes, Managing Editor	hermesc@aaesa.belvoir.army.mil	(703)805-1034/DSN 655-1034
Sandra R. Marks, Contract Support	markss@aaesa.belvoir.army.mil	(703)805-1007/DSN 655-1007
Joe Stribling, Contract Support	striblinga@aaesa.belvoir.army.mil	(703)805-1036/DSN 655-1036
		Datafax: (703)805-4218/DSN 655-4218

Purpose

To instruct members of the AL&T community relative to AL&T processes, procedures, techniques, and management philosophy and to disseminate other information pertinent to the professional development of the Army Acquisition Workforce.

Subject Matter

Subjects may include, but are not restricted to, professional development of the Army's Acquisition Workforce, AL&T program accomplishments, technology developments, policy guidance, information technology, and acquisition reform initiatives. **Acronyms used in manuscripts, photos, illustrations, and captions must be kept to a minimum and must be defined on first reference.**

Length of Articles

Articles should not exceed 1,600 words in length. This equates to approximately 8 double-spaced typed pages, using a 20-line page. **Do not submit articles in a layout format. ARTICLES CONTAINING FOOTNOTES OR ENDNOTES ARE NOT ACCEPTABLE.**

Photos and Illustrations

A maximum of 3 photos or illustrations, or a combination of both, may accompany each article. Photos may be black and white or color. **Illustrations must be black and white and must not contain any shading, screens, or tints. Submit illustrations in separate files from text.** Photos and illustrations will not be returned unless requested. **All scanned photos and illustrations must have a resolution of at least 300 dpi (JPEG or TIFF).** Glossy prints of all photos should also be submitted via the U.S. Mail, FedEx, etc.

Biographical Sketch

Include a short biographical sketch of the author/s that includes the author's educational background and current position.

Clearance

All articles must be cleared by the author's security/OPSEC office and public affairs office prior to submission. The cover letter accompanying the article must state that these clearances have been obtained and that the article has command approval for open publication.

Offices and individuals submitting articles that report Army cost savings must be prepared to quickly provide detailed documentation upon request that verifies the cost savings and shows where the savings were reinvested. Organizations should be prepared to defend these monies in the event that higher headquarters have a higher priority use for these savings. All Army AL&T articles are cleared through SAAL-ZAC. SAAL-ZAC will clear all articles reporting cost savings through SAAL-RI. Questions regarding this guideline can be directed to SAAL-RI, Plans, Programs and Resources Office, (703) 693-2685, DSN 223-2685.

Submission Dates

Issue	Author's Deadline
January-February	15 October
March-April	15 December
May-June	15 February
July-August	15 April
September-October	15 June
November-December	15 August

Submission Procedures

Article manuscripts (in MS Word), illustrations (300 dpi), and photos (glossy prints or 300 dpi JPEG or TIFF) may be submitted via e-mail to **bleicheh@aaesa.belvoir.army.mil**, or on a 3 1/2-inch floppy disk or a 100-MB ZIP disk via U.S. mail to DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. All submissions must include the author's mailing address, office phone number (DSN and commercial), and a typed, self-adhesive return address label.